



FLIGHT

The
AIRCRAFT
ENGINEER
AND
AIRSHIPS



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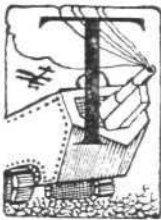
DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates
of important fixtures are invited to send particulars for
inclusion in this list :—

1927

- July 30 King's Cup Air Race, Hucknall, Nottingham.
- Aug. 1 Grosvenor Challenge Cup, Hucknall, Nottingham.
- Aug. 10-12 Navy v. R.A.F. Cricket Match.
- Aug. 12-21 International Meeting, Zurich
- Aug. 20—
- Sept. 2 International Aero Exhibition, Copenhagen.
- Sept. 5 Gordon-Bennett Balloon Race, Detroit, U.S.A.
- Sept. 25 Schneider Trophy Race at Venice.
- Oct. 20 Aero Golfing Soc. (Cellon Cup), Walton Heath.
- Oct. 31 Guggenheim Safe-Aircraft Competition Closes

EDITORIAL COMMENT.



War in
the Air

THIS has been an historic week for aviation in Great Britain. For the first time the British Royal Air Force has held manœuvres of its own on a large scale, as distinct from previous manœuvres held by the Army Co-operation units working with the Army. This year almost the whole of the R.A.F. stationed at home has been engaged, and one need not be an expert on war matters to realise that the very utmost importance attaches to the lessons which these manœuvres teach. At the moment of writing they are still in progress, and so no very definite conclusions can yet be drawn, but already sufficient has been learnt to make it quite clear that there is little hope of entirely preventing, in any future war, a powerful and determined enemy from reaching London or any other objective within his range. In the last war the British Navy succeeded in maintaining our food supplies and guarding our troop transports but it could not entirely prevent isolated dashes of the German fleet and a few attacks on coastal towns. In the air the position is much more difficult, because the third dimension has been added. Moreover, the attacker always has this great advantage, that he knows exactly what he intends to do and when he intends to do it, whereas the defender is necessarily uncertain, has to be prepared to rush his forces to any one of a number of points that might be selected for the attack, and generally is " kept on the jump." Consequently, nowhere is the dictum more true than in the air that the best defence is attack. Indeed, this is so obvious that it needed no practical demonstration by manœuvres, and doubtless the object of these was a somewhat different one. A defence there must always be, and the problems of how to organise the defence must be numerous and difficult. That much will be learnt is not to be doubted, and readers would be well advised to study carefully the accounts of the manœuvres by Maj. F. A. de V. Robertson, the first of which appears this week, to be followed by another next week.

The King's Cup

In the current issue of *FLIGHT* the subject of the King's Cup Race, which is to be flown from Hucknall Torkard aerodrome, near Nottingham, on Saturday next, is dealt with fairly fully. A list of the entries is given, as well as the handicap allowances received by the various machines entered. It seems likely that there will be certain cases in which the new handicap formula will "fall down," but, generally speaking, we believe that it will be found to give a reasonable degree of accuracy. In any case, probably the practice of racing by formula is to be preferred to leaving the handicapping to the whim of an individual, even if no formula can be expected to cover all possible extreme cases.

An examination of the handicap allowances seems to indicate that, like last year's formula, the new formula tends to under-estimate speeds. Comparison between "formula speeds" and known speeds of several machines indicates that this under-estimation is in the region of 15-20 per cent. It seems obvious that the formula has had its effect on some of the slowest machines, such as the ANEC II and the Halton biplane "Mayfly." The greater span of the ANEC has resulted in giving that machine a start of about 35 mins. as compared with the "Mayfly." We have not the exact speeds of the two machines, but it is fairly certain that the ANEC is the faster of the two. A start of 35 mins. in 540 miles is not a great deal, certainly, and good course-keeping may easily be made to counteract such a difference.

If the handicap allowances are examined carefully, it is found that certain machines of apparently identical type and with the same engine have received different allowances. This is probably due to a certain amount of machine "faking," it being known that several machines entered have had wing tip extensions added to them. An addition of but one foot to each tip increases the span by two feet, and

as it is span-squared which is used in the formula, even this small addition will have a considerable effect.

To those interested in the technical aspect of the race, it is rather illuminating to find that the new de Havilland "Tiger Moth" is only fourth from scratch, in spite of the fact that its engine is a "Cirrus II" of some 84 h.p. This machine actually gives a machine like the Hawker "Horsley," with 650 h.p. Rolls-Royce "Condor" a start of more than 10 mins. When one remembers the size and weight of the "Horsley" this is not, of course, so remarkable, but at first sight the position appears rather amusing.

The new Avro "Alpha Avian" with Avro "Alpha" engine appears to have done rather well under the handicap formula, as it is almost certain to be a good deal faster than its handicap allowance would indicate. As we have no dimensions of the wings of this particular machine, it is not possible to say definitely to what this is due, but most likely the wing span is a good deal greater than that of the standard "Avian."

Official Slot Control at Last

The mills of the Air Ministry grind exceeding slow, but in time they do get around to each little grain in turn. At the annual general meeting of Handley Page, Ltd., Mr. F. Handley Page was able to announce that all Bristol Fighters Mark III are being fitted with the Handley Page slot and aileron control. This announcement is of interest to others beside Handley Page shareholders. It is now seven or eight years since the slotted wing was introduced, and although it may not be the panacea for all evils which some expected, there can be little doubt that in the form of lateral controls it offers some very important advantages. That these are now to be thoroughly tested on a large scale is good news, and may bring much nearer the day when the results of stalls and subsequent spins are things of the past.

LOANS FOR U.S. AIR LINES

In our issue for July 21, we referred to the scheme for assisting the development of American air transport services—by means of equipment loans—put forward by the Daniel Guggenheim Fund, and we now give further details of the scheme.

The equipment loan plan of the Guggenheim Fund will not only provide equipment for the demonstration of performance, but will also provide a concrete example of aeronautical financing upon which further financing can be developed. The loans will be made only to existing operating companies for the purchase of the most modern, multi-engined planes of maximum safety and comfort, so that an actual demonstration of performance and safety will be available as an incentive for further development of passenger air lines in the United States.

Planes bought under the equipment loan provision must be designed to fly should one of the motors be disabled. The route or routes over which the new equipment will be flown must be approved for passenger carrying by the Aeronautical Division of the Department of Commerce, which, through William P. MacCracken, Jr., Assistant Secretary of Commerce for Aeronautics, will install on the selected routes the most up-to-date communications and meteorological services.

A survey will be made by the Daniel Guggenheim Fund in co-operation with the Department of Commerce and operators of existing air-mail routes for the purpose of selecting the most favourable routes for undertaking this practical experiment.

The Guggenheim Fund has always emphasized the fact that aviation must progress through the development of commercial flying. The Fund, which has for its primary purpose the promotion of ways and means of securing safety

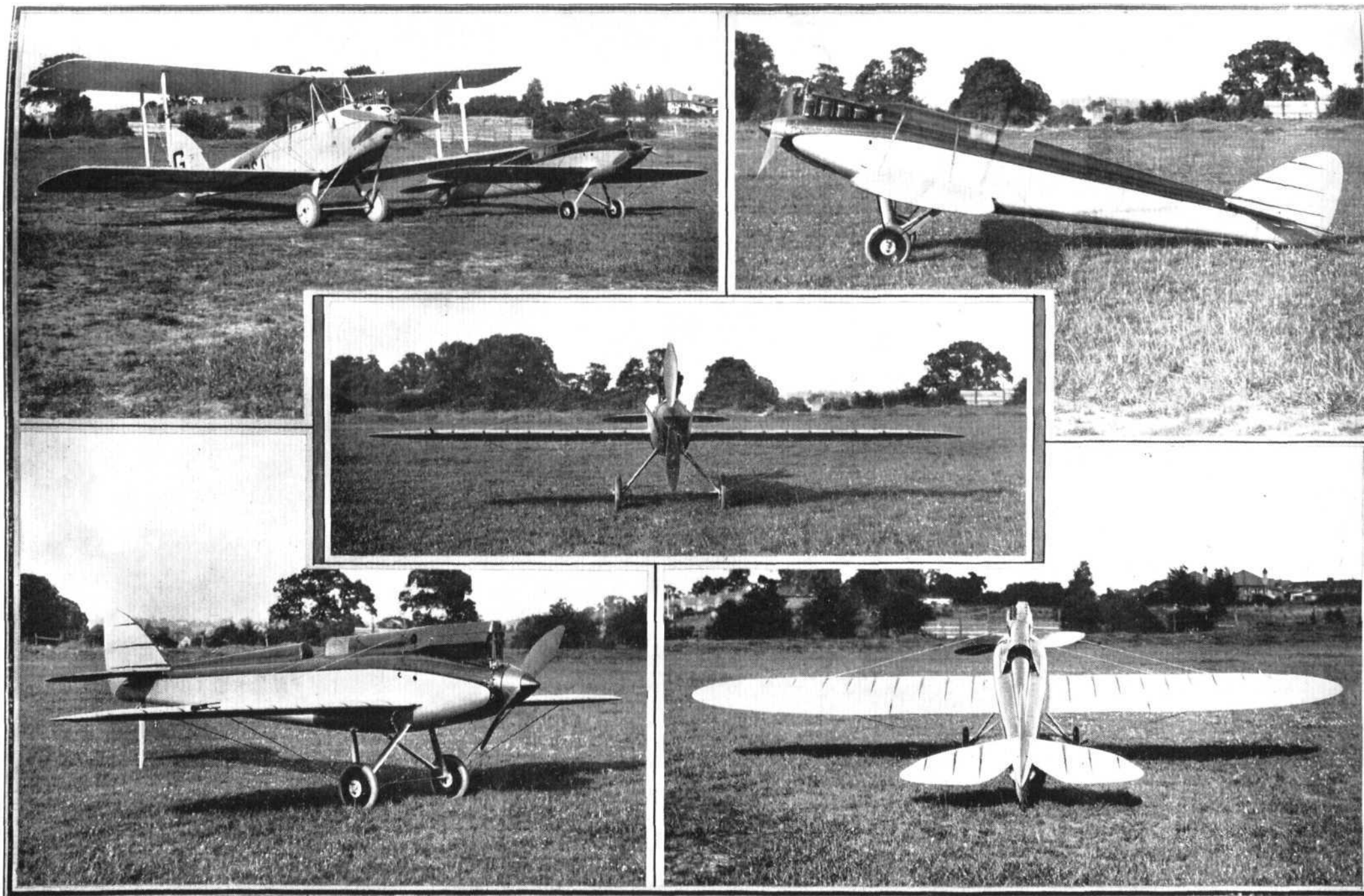
in flying, believes that popular support can be obtained for commercial air-lines provided they give continued demonstrations of performance and safety. The equipment loans offered by the Fund are made solely for the purpose of allowing a reputable company further scope in demonstrating the practicability of aircraft in modern everyday life.

Preliminary arrangements for a discussion of the equipment loans were considered at a meeting of representatives of each of the contract air-mail services in New York some time ago. It was emphasised at the meeting that Europe has developed her aerial passenger-carrying facilities to a high degree, while the United States has specialised in the air-mail service.

On the other hand, America, it was pointed out, was better suited to aerial passenger services, since distances in this country are greater and the use of aeroplanes would materially reduce the time necessary to travel between the larger cities. The operators were unanimous in approving the equipment loan idea.

Passenger air lines in Europe have been aided very greatly by State financial assistance. In the United States, however, air transportation has been developed primarily without direct Government subsidy, as exemplified in the air-mail service, all of the lines of which have been turned over to private operators.

Multi-engined passenger-carrying planes embodying the latest designs for comfort and safety are expensive, both to buy and to operate. Lack of financial support has held back the development of this phase of aeronautics in the United States, principally because the immediate response from traffic was not sufficient to allow operating companies to spend a large amount of money for equipment, the performance of which would draw further traffic.



THE NEW DE HAVILLAND "TIGER MOTH" WITH DE HAVILLAND ENGINE: These four views give a good idea of the extremely clean lines of this miniature racer. The photograph of the new machine standing next to a standard "Moth X" serves to indicate how almost absurdly small is the "Tiger Moth." The only struts in the machine are the undercarriage Vees. For the rest the bracing is by Rafwire.

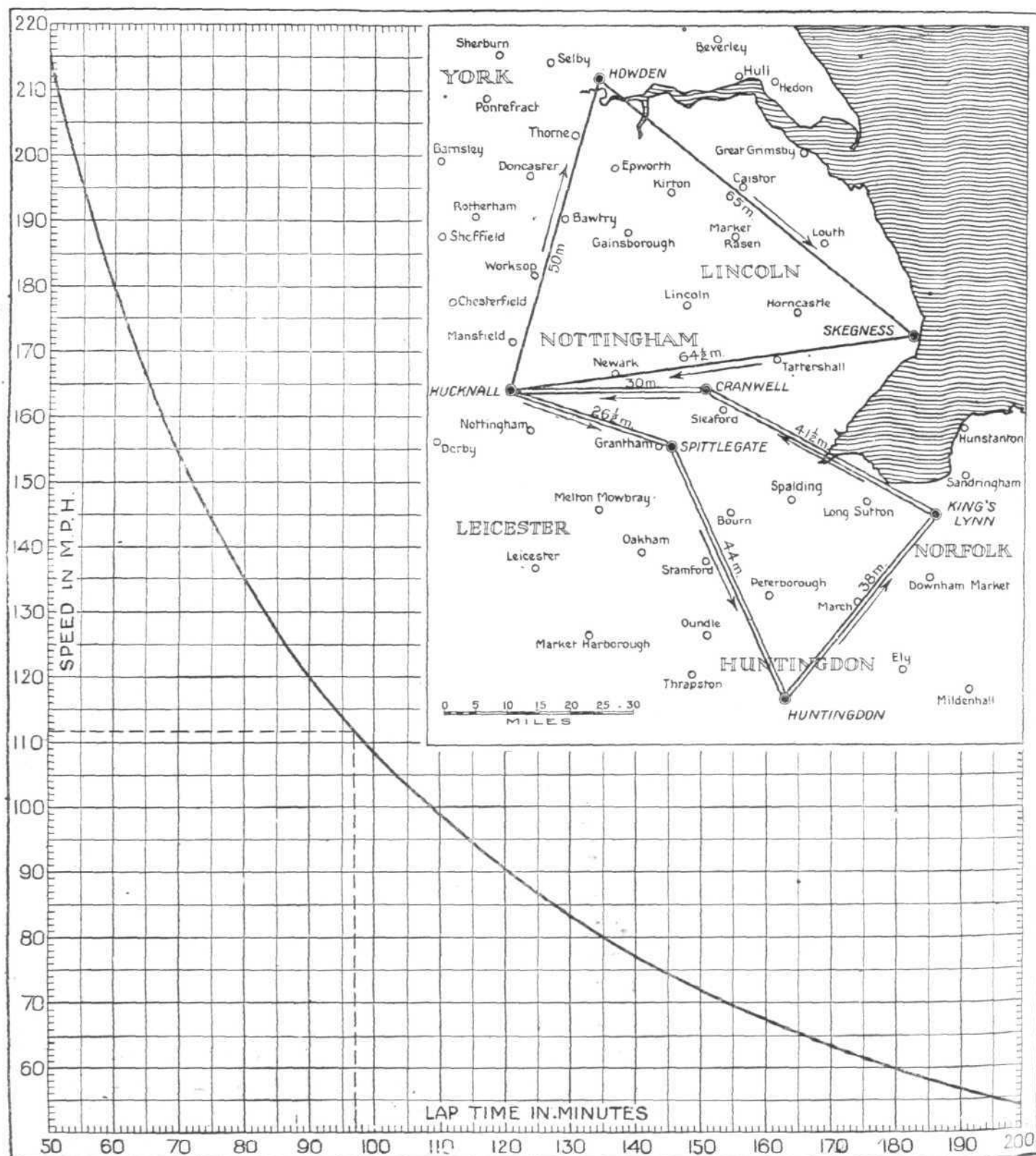
["FLIGHT" Photographs]

THE KING'S CUP AIR RACE

And August Bank Holiday Meeting

MAINLY on account of the fact that it is being flown in accordance with a new handicapping formula, the race for the King's Cup, organised by the Royal Aero Club and under the competition rules of the F.A.I., which takes place on Saturday next, July 30, at Hucknall Torkard aerodrome, near Nottingham, should be of considerable interest. The subject of handicapping by formula is ably dealt with by Mr. Mettam in this week's issue of THE AIRCRAFT ENGINEER,

and the more technically minded among our readers will doubtless find much to interest them in that article. Here it will suffice to point out that from an examination of the speeds as worked out by the formula and the speeds of which certain of the machines entered are known to be capable, it would appear that the handicap formula under-estimates the speed of machines by something like 15 to 20 per cent. Naturally this does not hold good in all cases, but seems to be a fair



THE KING'S CUP RACE: Graph showing speed against lap time for the 180 miles' circuit. For the benefit of readers not familiar with the use of graphs, it may be explained that the dotted lines show an example: A machine is timed to have taken 97 minutes to cover the course. From the 97 minutes on the bottom scale run a line up to the curve. From point where this line cuts the curve draw a horizontal line to the left. This, in the example, is found to fall just below the 112 m.p.h. point, so that the speed is about 111.7 m.p.h. The inset shows the two courses. The lower is flown first, then the upper, and then the lower again.

COMPETITORS IN THE KING'S CUP AIR RACE, JULY 30, 1927.

Racing No.	Entrant.	Machine.	Engine.	Pilot.	Handicap.
					hr. m. s.
6	N. H. Jones	A.N.E.C. II	Bristol "Cherub III" ..	M. W. Piercey	4 57 48
4	Wing-Com. C. Breese ..	Halton biplane	Bristol "Cherub III" ..	Fl. Lt. Le Poer Trench ..	4 23 35
27	Fl. Lt. N. Comper	C.L.A. 4	Bristol "Cherub III" ..	Fl. Lt. Comper	4 9 43
5	W. L. Hope	D.H. "Moth"	A.D.C. "Cirrus I"	W. L. Hope	3 25 9
9	P. S. Foster	D.H. "Moth"	A.D.C. "Cirrus I"	A. B. H. Youell	3 16 25
26	Sir H. Bowden	D.H. "Moth X"	A.D.C. "Cirrus II"	B. Martin	3 1 49
18	S. L. F. St. Barbe	D.H. "Moth X"	A.D.C. "Cirrus II"	Capt. F. G. M. Sparks ..	3 1 49
15	A. S. Butler	D.H. "Moth X"	A.D.C. "Cirrus II"	A. S. Butler	3 1 49
12	A. V. Roe	Avro "Avian"	A.D.C. "Cirrus II"	Dudley Watt	2 53 39
10	H. Brooklyn	Westland "Widgeon III" ..	Siddeley "Genet"	H. Brooklyn	2 53 14
2	Col. The Master of Sempill ..	Blackburn "Bluebird II" ..	Siddeley "Genet"	Col. The Master of Sempill ..	2 49 30
3	The Hon. Lady Bailey	D.H. "Moth"	A.D.C. "Cirrus II"	The Hon. Lady Bailey	2 45 50
22	R. A. Bruce	Westland "Widgeon III" ..	A.D.C. "Cirrus II"	Capt. J. McDonough	2 41 28
23	J. F. Leeming	Avro "Avian"	A.D.C. "Cirrus II"	H. A. Brown	2 37 34
8	H. Fildes	Avro "Avian II"	A.D.C. "Cirrus II"	Mrs. S. C. Elliott-Lynn ..	2 37 34
13	Sir William Letts	Avro "Alpha-Avian"	"Alpha II"	B. Hinkler	2 24 36
14	Sir William Letts	Avro "Avian"	A.D.C. "Cirrus II"	—	2 20 43
24	Lt.-Col. Barrett-Lennard ..	D.H.9 "Nimbus"	A.D.C. "Nimbus"	W. R. Hinchliffe	1 35 57
19	Sir A. Trevor Dawson	Vickers "Vespa"	Bristol "Jupiter VI"	Sq. Ldr. H. J. Payn	1 24 7
7	T. O. M. Sopwith	Hawker "Horsley"	Rolls-Royce "Condor III" ..	Fl. Lt. P. W. S. Bulman ..	1 17 31
1	L. Hamilton	Martinsyde F. 6	Wolseley "Viper"	F./O. N. Vincent	1 13 53
16	Sir C. Wakefield	D.H. "Tiger Moth"	A.D.C. "Cirrus II"	Capt. H. S. Broad	1 7 19
20	Douglas Vickers	Vickers "Vixen III"	Napier "Lion V"	Fl. Lt. Scholefield	1 3 32
25	Lt. Col. M. O. Darby	"Boreas Nimbus" Martinsyde ..	A.D.C. "Nimbus I"	Sq. Ldr. W. G. Jones	0 47 57
21	Sir G. Stanley White	Bristol "Badminton"	Bristol "Jupiter VI"	Capt. F. L. Barnard	0 22 32
11	Sir Kenneth Crossley	Avro "Avenger"	Napier "Lion VIII"	Fl. Lt. S. N. Pope	Scratch.

MONDAY, 1st AUGUST, 1927.

Event No. 1.—Papplewick Stakes, £75. Low-Power Handicap.

Racing No.	Entrant.	Aeroplane.	Engine.	Pilot.
4	Halton Aero Club	Halton Biplane	Bristol "Cherub III"	Fl. Lt. C. F. Le Poer Trench.
27	Felixstowe Aero Club	C.L.A.4	Bristol "Cherub III"	Fl. Lt. N. Comper, or W. L. Payne.
6	Norman H. Jones	A.N.E.C. II	Bristol "Cherub III"	Norman H. Jones.
30	London Aeroplane Club	Bristol "Brownie"	Bristol "Cherub III"	L. J. C. Mitchell.
33	R.A.E. Aero Club	Hawker "Cygnets"	Bristol "Cherub III"	Fl. Lt. R. L. Ragg.
34	R.A.E. Aero Club	D.H.53	Bristol "Cherub III"	F./O. C. Mackenzie-Richards.

Event No. 2.—Pelham Stakes, £100. Private Owners' Handicap.

2	Col. The Master of Sempill ..	Blackburn "Blue-Bird II" ..	Armstrong-Siddeley "Genet" ..	Col. The Master of Sempill.
10	Harold Brooklyn	Westland "Widgeon III" ..	Armstrong-Siddeley "Genet" ..	Harold Brooklyn.
6	Norman H. Jones	"A.N.E.C. II"	Bristol "Cherub III"	Norman H. Jones.
22	Robert A. Bruce	Westland "Widgeon III" ..	"Cirrus II"	Capt. W. J. McDonough.
18	A. C. M. Jackaman	D.H. "Moth X"	"Cirrus II"	A. C. M. Jackaman.
31	F./O. A. F. Scroggs, R.A.F. ..	Westland "Wood Pigeon" ..	Anzani	F./O. A. F. Scroggs.
26	Sir Harold Bowden, Bart. ..	D.H. "Moth X"	"Cirrus II"	Bernard Martin.
32	Capt. Geoffrey de Havilland ..	D.H. "Moth X"	"Cirrus II"	Capt. G. de Havilland.
3	The Hon. Lady Bailey	D.H. "Moth"	"Cirrus II"	The Hon. Lady Bailey
1	Leslie Hamilton	Martinsyde F.6	Wolseley "Viper"	F./O. Nevill Vincent, D.F.C.
36	Major J. C. Savage	S.E.5A	Wolseley "Viper"	M. L. Bramson.
8	Mrs. S. C. Elliott-Lynn	Avro "Avian II"	"Cirrus II"	Mrs. S. C. Elliott-Lynn.
9	Mrs. S. C. Elliott-Lynn	D.H. "Moth"	"Cirrus I"	Mrs. S. C. Elliott-Lynn.
37	F./O. James R. Addams	Westland "Widgeon II" ..	Armstrong-Siddeley "Genet" ..	F./O. J. R. Addams.

Event No. 3.—Society of British Aircraft Constructors Challenge Cup.

4	Halton Aero Club	Halton Biplane	Bristol "Cherub III"	Fl. Lt. C. F. Le Poer Trench.
27	Felixstowe Aero Club	C.L.A.4	Bristol "Cherub III"	Fl. Lt. N. Comper, or W. L. Payne.
28	London Aeroplane Club	D.H. "Moth"	"Cirrus I"	Capt. H. Spooner.
35	R.A.E. Aero Club	Avro "Avian"	"Cirrus II"	F./O. D. W. F. Bonham-Carter.

Event No. 4.—Hucknall Stakes, £150. High-Power Handicap.

11	A. V. Roe & Co.	Avro "Avenger"	Napier "Lion VIII"	Fl. Lt. S. N. Pope.
24	Lieut.-Col. J. Barrett-Lennard ..	D.H. 9 "Nimbus"	"Nimbus I"	W. G. R. Hinchliffe.
25	Lieut.-Col. M. O. Darby	"Boreas Nimbus" Martinsyde ..	"Nimbus I"	Sq.-Ldr. Hubert W. G. Jones, M. C.
1	Leslie Hamilton	Martinsyde F.6	Wolseley "Viper"	F./O. Nevill Vincent, D.F.C.
36	Maj. J. C. Savage	S.E. 5A	Wolseley "Viper"	M. L. Bramson.

Event No. 5.—Ladies' Purse.

28	London Aeroplane Club	D.H. "Moth"	"Cirrus I"	Miss S. O'Brien.
29	London Aeroplane Club	D.H. "Moth"	"Cirrus I"	Miss S. O'Brien.
3	The Hon. Lady Bailey	D.H. "Moth"	"Cirrus II"	The Hon. Lady Bailey.
8	Mrs. S. C. Elliott-Lynn	Avro "Avian II"	"Cirrus II"	Mrs. S. C. Elliott-Lynn.
9	Mrs. S. C. Elliott-Lynn	D.H. "Moth"	"Cirrus I"	Mrs. S. C. Elliott-Lynn.

Event No. 6.—The Grosvenor Challenge Cup.

2	Col. the Master of Sempill ..	Blackburn "Blue Bird II" ..	Armstrong-Siddeley "Genet" ..	Col. the Master of Sempill.
12	A. V. Roe	Avro "Avian"	"Cirrus II"	Dudley Watt.
13	Sir William M. Letts, K.B.E. ..	Avro "Alpha-Avian"	"Alpha II"	B. Hinkler.
10	Harold Brooklyn	Westland "Widgeon III" ..	Armstrong-Siddeley "Genet" ..	Harold Brooklyn.
22	Robert A. Bruce	Westland "Widgeon III" ..	"Cirrus II"	Capt. W. J. McDonough.
28	Capt. H. Spooner	D.H. "Moth"	"Cirrus I"	Capt. H. Spooner.
29	O. J. Tapper	D.H. "Moth"	"Cirrus I"	O. J. Tapper.
26	Sir Harold Bowden, Bart. ..	D.H. "Moth X"	"Cirrus II"	Bernard Martin.
32	Capt. Geoffrey de Havilland ..	D.H. "Moth X"	"Cirrus II"	Capt. G. de Havilland.
3	The Hon. Lady Bailey	D.H. "Moth X"	"Cirrus II"	The Hon. Lady Bailey.
35	P. N. G. Peters	Avro "Avian"	"Cirrus II"	F./O. D. W. F. Bonham-Carter.
8	Mrs. S. C. Elliott-Lynn	Avro "Avian II"	"Cirrus II"	Mrs. S. C. Elliott-Lynn.
9	Mrs. S. C. Elliott-Lynn	D.H. "Moth"	"Cirrus I"	Mrs. S. C. Elliott-Lynn.
37	F./O. James R. Addams	Westland "Widgeon II" ..	Armstrong-Siddeley "Genet" ..	F./O. J. R. Addams.

average. Thus it is possible that some fairly close finishes may be obtained. It should be borne in mind, however, that one factor is not taken into account at all in the formula—the velocity of the wind. It is, of course, obvious that slow machines are affected by wind to a greater extent than are fast machines, and should the day of the race be one with a strong wind blowing, it may well be that the low-power machines such as the ANEC, the CLA4, and the Halton biplane will be hopelessly outclassed. Thus, presumably those interested in slow machines will be praying for a flat calm, while those who are banking on high-speed 'buses will welcome a young gale.

Concerning the majority of entries little need be said, as most are already well known. There has, however, been a good deal of activity during the last week or two trying to get the better of the handicap formula by adding a foot or two to the wing span of a number of machines. As it is the square of the span which counts in the formula, every little bit helps. At least one firm has gone as far as to make special "handicap wings," tapering to a point at the tips, so as to get credit for the span without adding very much area. It is conceivable that in this manner a very considerable gain may be obtained.

Novelties in the Race

In the light 'plane class two very interesting entries are the Avro "Alpha-Avian" and the de Havilland "Tiger Moth." Concerning the former very little is known. The "Alpha" engine is, of course, a new Avro radial air-cooled of round about 100 h.p. This engine made its first public appearance at the Manchester Air Pageant, when it was fitted in the Avro "Gosport." It made a very favourable impression, what with its obvious simplicity and its "clean" outward lines, free from excrescences. The extra power should result in a considerable increase in the speed of the "Avian." Concerning the machine little is known. It may be recollected that at the Lympne competition the "Avian" had wings of very large span, and it would appear that these might be very favourable under the King's Cup formula.

The de Havilland "Tiger Moth" promises to be one of the most amazing light 'planes every produced. In its design the de Havilland Aircraft Co. have aimed at a racing machine pure and simple (at least, that is how the machine is regarded at present; very likely in a year's time it will be looked upon as the "super-sports" model of the "Moth"). Or one might say that the machine represents an example of high speed research with low power and at reasonable cost. From whatever point of view one regards it, the "Tiger Moth" is a fascinating little 'bus.

through openings at the back. As a racing engine the DH should be very effective with its small frontal area, and we gather that it is for racing that it has been produced.

When work first commenced on the D.H. engine it was realised that it would be a race against time, and it is most unfortunate that it has been found impossible to get the engine through its type tests in time for the King's Cup Race. In consequence, the D.H. engine is not permitted to be used, but one will, we are informed, be fitted in one of the two "Tiger Moths" entered, and will be demonstrated at Hucknall. The second machine is to be fitted with a "Cirrus" engine, and will fly in the race. Needless to say it will not be anything like as fast as if the D.H. engine had been used, but for all that we fancy that the little monoplane will be something of an eye opener. The D.H. engine, by the way, is designed to give something more than 100 h.p., as compared with a maximum of 84 h.p. for the "Cirrus II."

The Course

This year's King's Cup Course consists of two circuits, the southern being flown first, then the northern, and then the southern again, the machines making a compulsory stop of 30 mins. at Hucknall at the end of each circuit. From our sketch map it will be observed that the two circuits are being flown in opposite directions. This has been decided upon



The Avro "Alpha-Avian" is fitted with the new Avro Alpha engine.

The machine was literally built around Capt. Broad (he has been sitting inside the fuselage for the last four weeks, takes nourishment through a tube, and will not emerge until after the race, when the machine will have to be dismantled before he can get out!). Quite seriously, not a square inch of cross-sectional area has been wasted—as will be gathered when we state that the width of the fuselage is 17 ins. To enable Broad to get in and out, the coaming, wind-screen, etc., have been hinged, opening and closing like doors. The deck fairing merges into the cylinder block in front, and extends aft right down to the fin. There are only two struts in the machine, the two undercarriage vees. For the rest, the wing is braced entirely by streamline wires. Even the customary axle has been supplanted by wires, the wheels being of the type in which the shock-absorbers are housed inside the enlarged wheel hubs, with the main lift wires running from the fixed part of the wheel. The span is only some 24 ft. and the wing area 74 ft. A thin wing section is used (a modified R.A.F. 15).

The new de Havilland engine comes as a surprise to most people. It is a four-cylinder in-line air-cooled, designed by Maj. Halford, the designer of the "Cirrus." Except that it has the same four-in-line cylinder arrangement, the DH engine has little similarity with the "Cirrus." The carburettor is at the back, the magnetos are tucked away neatly, and altogether every possible component has been mounted where it will interfere the least with the smooth air flow. As installed in the "Tiger Moth," the new DH engine is totally cowled-in, the air entering through small openings in front and leaving

so as to avoid risk of collision between machines over the stretch near Hucknall where the legs of the two circuits approach very near to one another. If both were flown in an anti-clockwise direction, there would be some risk of machines meeting head on. As it is, the machines flying one circuit will, at this point, be going in the same direction as the machines flying on the other circuit.

As many of our readers who are visiting Hucknall aerodrome for the race may wish to time the machines, we have prepared a graph which gives the speeds and lap times over a wide range of speeds. The graph refers, of course, to a single circuit (i.e., of 180 miles), and from the curve it will be easy, if the lap time of any machine is known, to ascertain the average speed around the circuit. Those readers who are not familiar with the use of graphs will find brief instructions in the inscription.

A table containing the entries, handicap allowances, &c., in the King's Cup Race is published in this issue. It only remains to point out that owing to previous experience of the difficulty of reading the normal identification letters on a machine during a race, the large letter G normally painted on the rudders of all British civil aeroplanes will be replaced in the King's Cup Race by a number. The identification letters on the fuselage and wings will be retained. The numbers given in our table are those which the machines will carry in the race. It might further be pointed out that the numbers have no significance as regards the order of starting in the race, being merely an indication of the sequence in which the entries were received by the Royal Aero Club.

THE WESTLAND "WIDGEON III"

"Cirrus II" or "Genet II" Engine

THE old controversy—biplane or monoplane—has by no means been settled yet, and it is only to be expected that in the light 'plane class the fight will go on for some time, the more so as it is now becoming realised that there is very little to choose between the two types. There is, however, this difference—that whereas in the earlier days of aviation the dispute centred mainly on aerodynamic efficiency, in modern times, and especially since the Lanchester-Prandtl

on account of smaller overall dimensions, which affect the question of housing, and consequently we see some designers choose the biplane as being the more compact type. On the other hand, it is possible so to arrange the monoplane that the overall dimensions do not greatly exceed those of a biplane of the same weight, while at the same time gaining certain not inconsiderable advantages, such as unrestricted view from the pilot's cockpit, ease of access to both cockpits



["FLIGHT" Photograph]

THE WESTLAND "WIDGEON III": Front view. The engine is a "Cirrus," Mark II.

aerofoil theory became generally accepted, it has become clear that from the point of view of aerodynamic efficiency the two types are so nearly equal that there is no valid reason for believing that on this score one type will ever entirely oust the other. Thus, from the point of view of induced drag, the biplane is, for a given span, more efficient than the monoplane, but maximum lift coefficient is slightly greater for the monoplane than for the biplane. As regards profile drag, the monoplane will, generally speaking, require

of a two-seater, and so forth. Thus, in asking oneself the question why this or that designer has chosen one or the other of the two types, it is usually into the practical considerations that one should look for an answer. In this country we may almost be said to have specialised on the biplane. Probably more than 95 per cent. of all British machines built during the last 10 years have been of the biplane type. In Germany, on the other hand, the monoplane has been the more popular type, although there appears



["FLIGHT" Photograph]

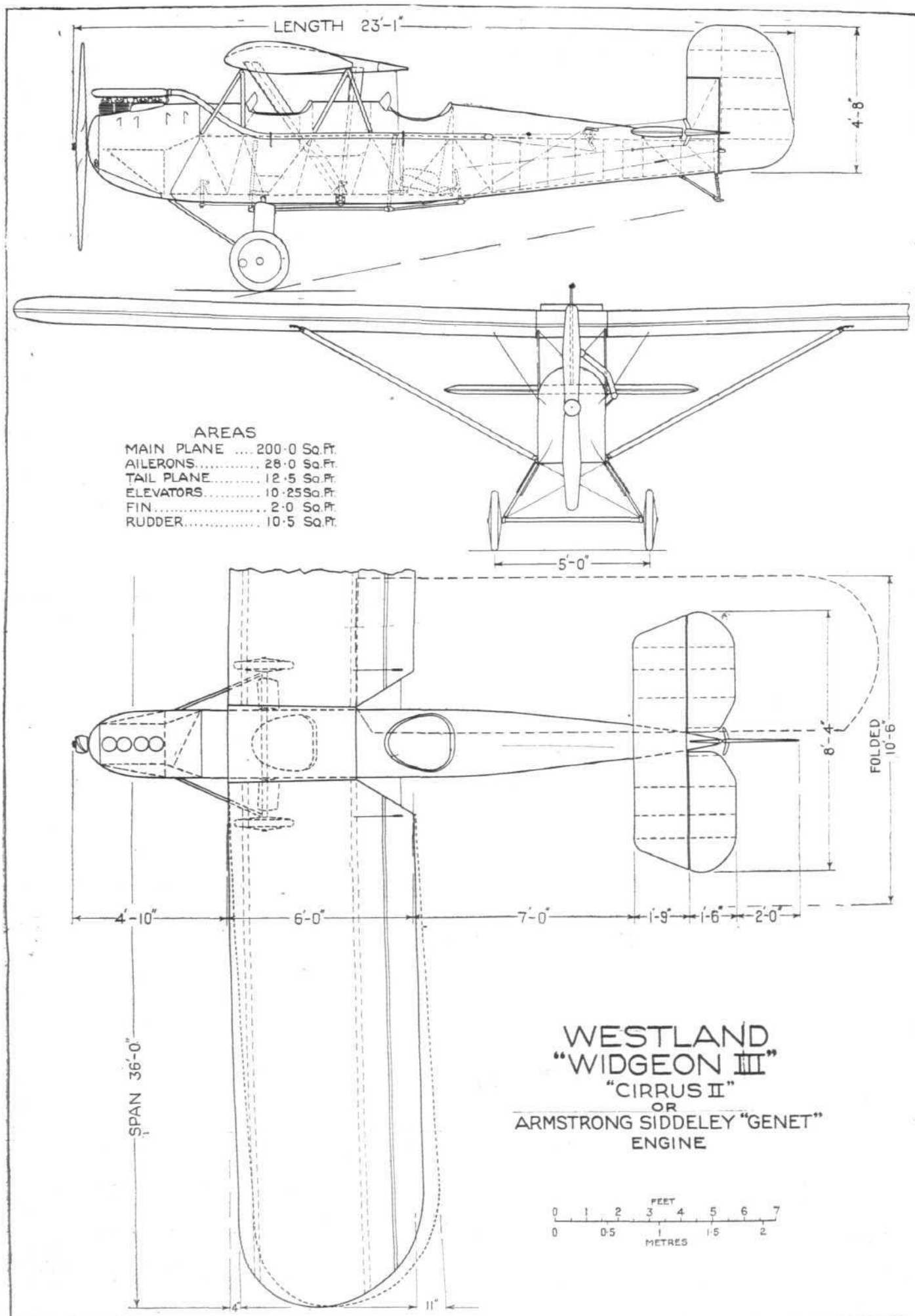
THE WESTLAND "WIDGEON III": Three-quarter rear view.

a slightly thicker wing section to give an economical wing weight, and it is usually found that with biplanes of normal arrangement the gain in profile drag obtained by the use of the thinner aerofoil which the biplane arrangement permits is approximately balanced by the drag of the external bracing of the biplane, and so we arrive at practically a "dead heat" between the two types as far as aerodynamic efficiency is concerned.

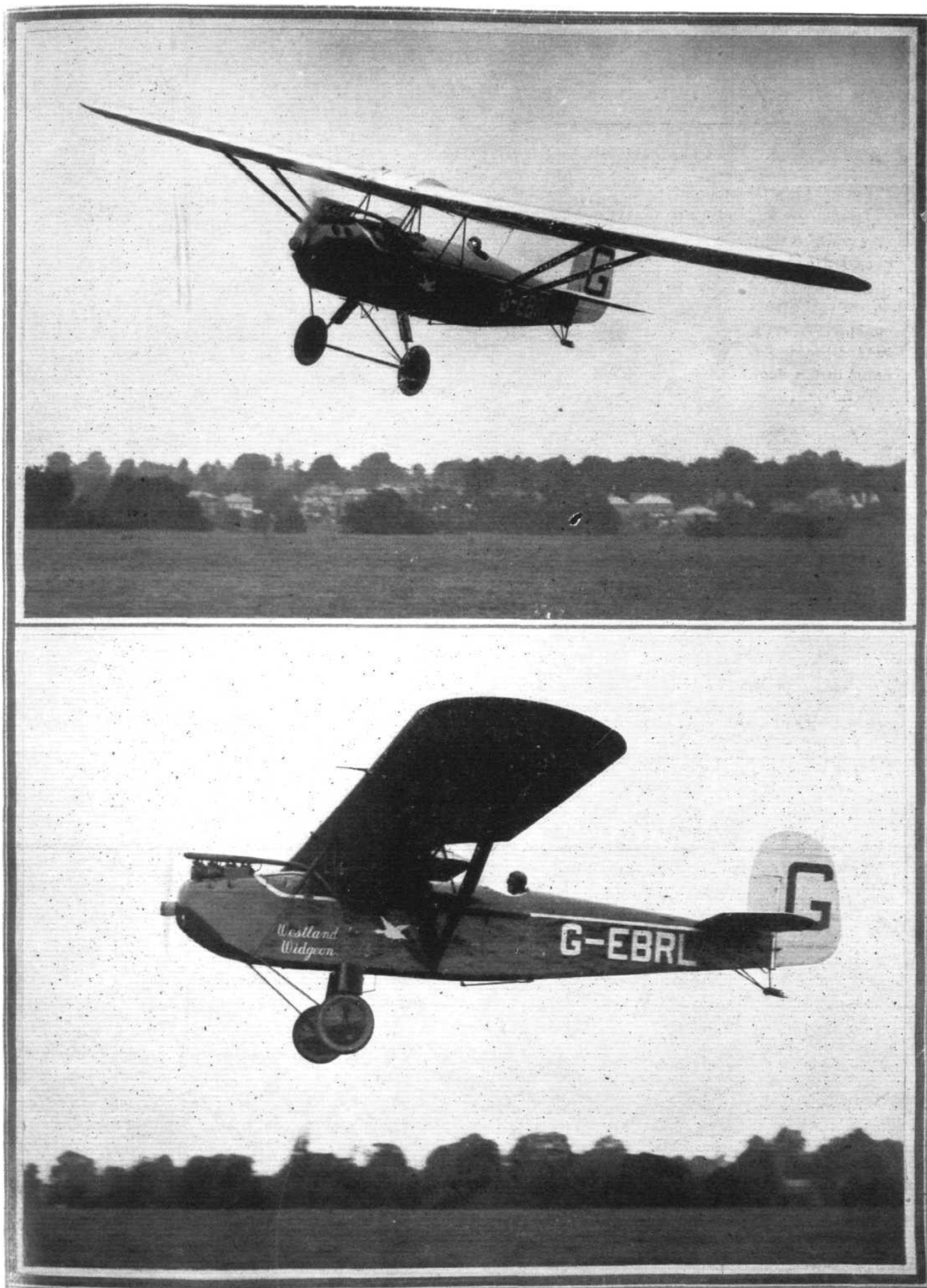
There still remains what may be termed the "practical" side of the question, and here there is scope for the designer's personal views. The biplane may perhaps be said to score

of recent years to be a tendency to change over to the biplane. France has divided her attentions more or less equally between the two types.

When, amid the number of biplanes in this country, a monoplane type appears, there is thus bound to be speculation as to the reasons which led to the choice of the more unusual machine. In the case of the Westland "Widgeon III," which forms the subject of this descriptive article, we believe that practical rather than aerodynamic considerations led to the decision to market a monoplane, and by choosing the parasol type of monoplane the Westland Aircraft Works



THE WESTLAND "WIDGEON III": General Arrangement Drawings, to Scale. The dotted lines in the plan view show the sweep-back of the "Genet"-engined machine.

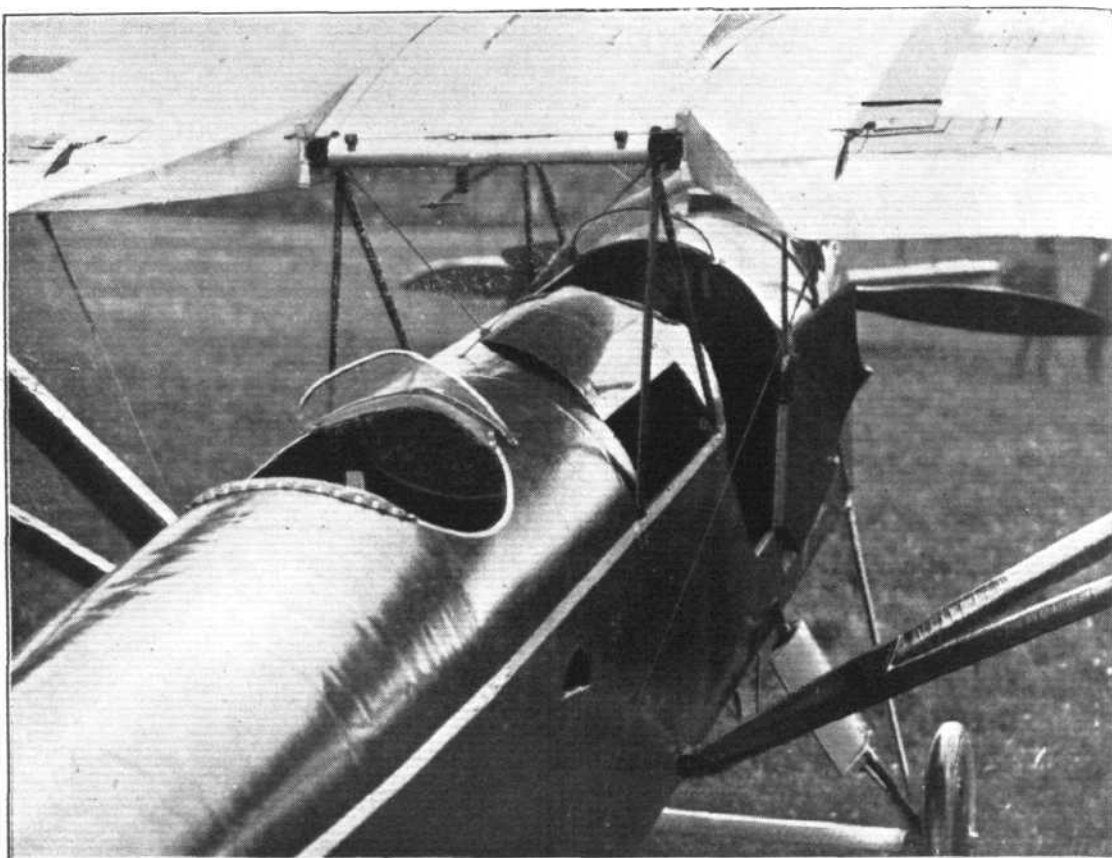


[“FLIGHT” Photographs]

TWO VIEWS OF THE WESTLAND “WIDGEON III” IN FLIGHT: Piloted by Mr. R. Brooke-Tapp.
The upper picture gives a good idea of the excellent view from the pilot’s cockpit.

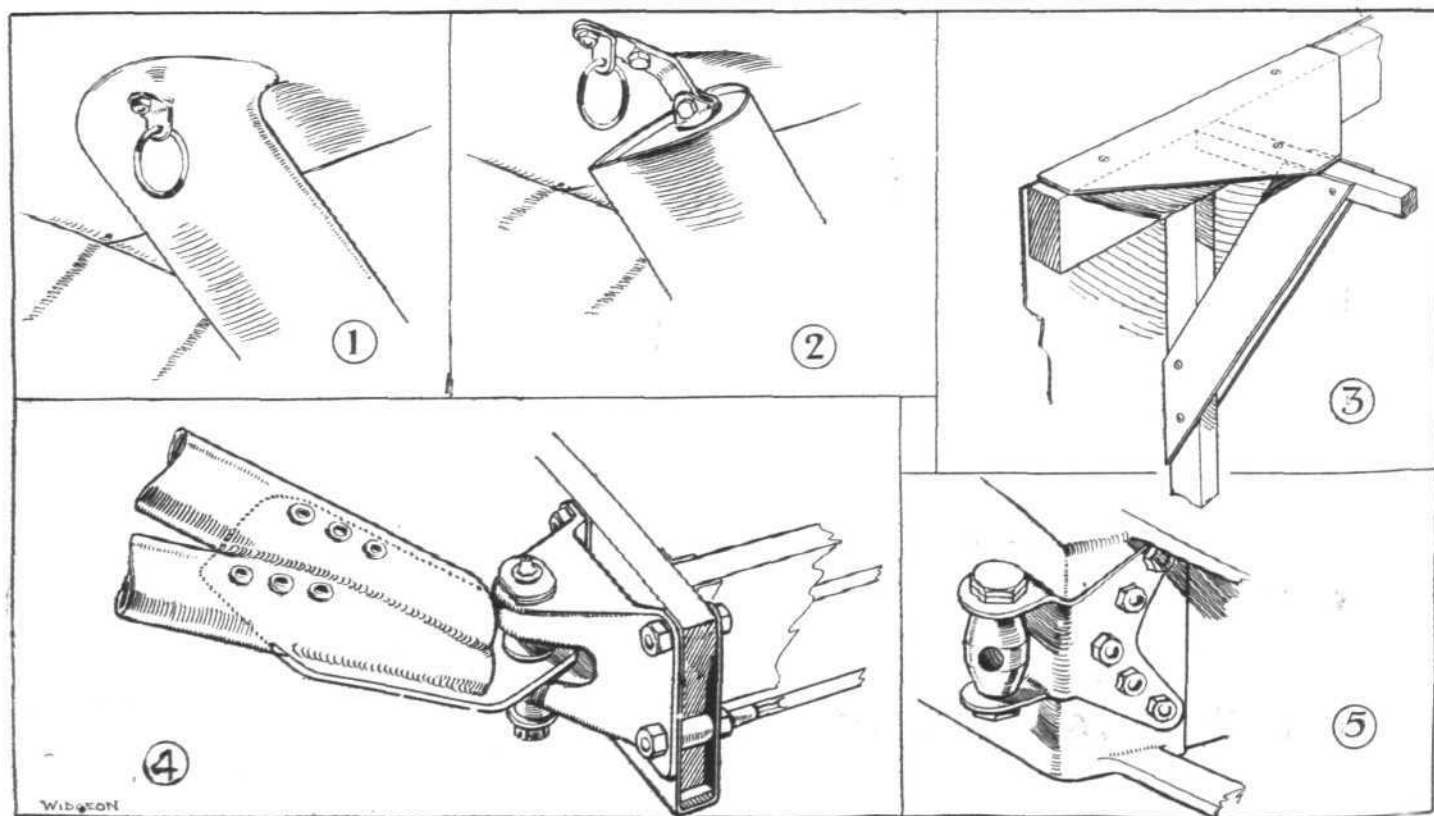
"FLIGHT" Photograph

Cockpits of the Westland "Widgeon III": Note the door giving access to the front cockpit. Also the luggage compartment in the deck fairing.



of Yeovil claim to have attained certain very practical advantages. For instance, the placing of the wing some distance above the fuselage provides an all-round view which would not be possible in a biplane. Downwards, to the sides, forward and aft, there is nothing but the fuselage to hinder the view. Placed as he is some distance aft of the wing, the pilot can look in all directions except diagonally, forwards and upwards, and even here, owing to the angle

between the wing and the line of vision, only a very small area is obscured by the wing, which is, in fact, seen by the pilot almost "edge on." The passenger is situated immediately below the wing, and thus cannot see upwards, but otherwise he (or she) also has an unobstructed view. Moreover, the parasol arrangement greatly facilitates access to the cockpits, the aft, or pilot's, being clear of the cut-out in the wing, and the front one being reached through a



THE WESTLAND "WIDGEON III": Some constructional details. 1, shows the manner of fairing the wing strut attachment with papier mache, the actual metal fitting being shown in 2. A typical fuselage joint is illustrated in 3, while 4 shows the attachment of lift struts to lower fuselage longeron. The hinge on the rear wing spar is shown in 5. This engages with a corresponding fitting on the centre-section, and forms the hinge for folding the wings.

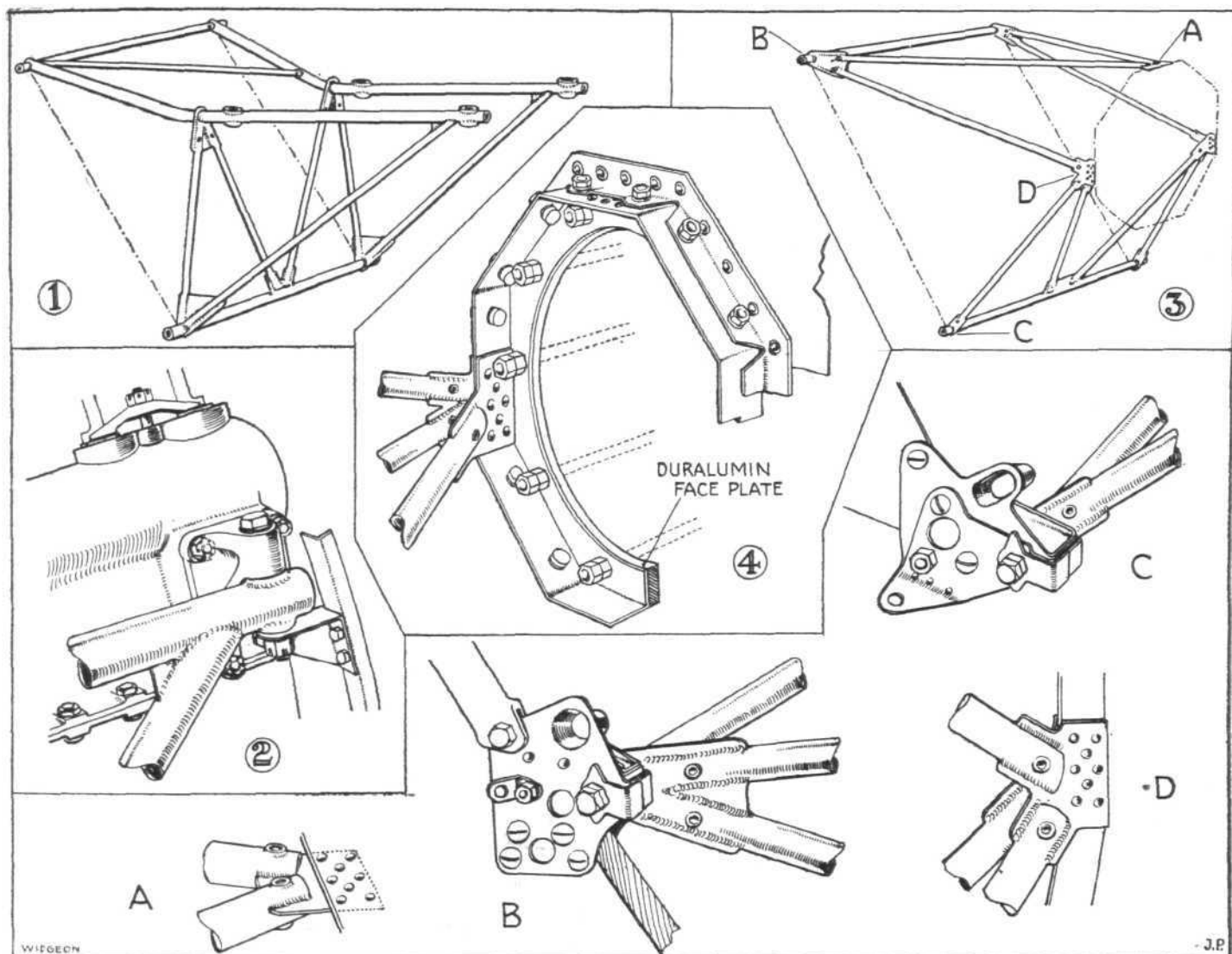
"FLIGHT" Copyright Sketches

small door, much as one enters a motor-car. The fact that the wing is strut-braced makes for a minimum of encumbrances, and the front seat is reached entirely without the acrobatic feats required in some machines.

The strut bracing of the "Widgeon" wing is also claimed to reduce maintenance cost, since there are no wires whatever in the machine, other than control cables, to require attention. Once in place on the machine, the wing bracing is not touched except in case of damage, and the wing will, it is claimed, remain true without any attention from the user. The arrangement of the wing struts of the "Widgeon" is such that folding the wings is an extremely easy operation, all that is necessary being the release of two pins, one on each side, when the two halves of the wing are free to swing back along the tail. The aileron cables are so arranged

bracing, the inner framework being covered and partly braced by the three-ply "skin." From the fact that three-ply is used for covering it will be gathered that the fuselage is flat-sided and flat-bottomed. The deck, however, is of the usual curved or cambered shape, made up in panels or sections, and supported internally by hoops or formers. Experience has shown this type of fuselage construction to be rigid, capable of standing hard wear, and requiring a minimum of attention during use. A fabric covering on top of the three-ply protects it against moisture.

The cockpits, as already stated, are very easy of access, and are in addition roomy and comfortable. Dual controls are provided, so that the machine may be flown from either cockpit, or the front controls may be disconnected if the machine is being used for passenger work only. The instru-



"FLIGHT" Copyright Sketches

THE WESTLAND "WIDGEON III" : Details of the two types of engine mountings which have been standardised. 1, shows the welded steel tube mounting for a "Cirrus" engine, with a more detailed view of a front engine bracket in 2. The mounting for the "Genet" engine is shown in 3, with details of the Duralumin face-plate in 4. Sketches A, B, C and D refer to details at corresponding points of 3.

that as the wings fold back the return cable goes slack, allowing the ailerons to hang down, and thereby reducing the folded width of the machine, which in the folded condition is only 10 ft. 6 in.

Thus the main features of the "Widgeon III" of interest to the owner-pilot may be summed up as follows: excellence of view, ease of access to cockpits, absence of wire bracing, with consequent reduction in maintenance cost and work, and general simplicity of construction. This summary does not, however, by any means exhaust the features of the machine, as the following descriptive notes on the construction will show.

Constructional Features

It has already been pointed out that simplicity of construction is one of the objects aimed at in the "Widgeon III." Thus the fuselage is of the type in which there is no wire

ments, which include the usual range, are very neatly arranged and the various dials are easily seen. The seats are somewhat unusual in that they are separate from their back rests. Normally, fairly high seats, of light ply-wood construction, are fitted, and provided with air cushions. Should the owner prefer to fly regularly with a pack parachute, the seats are changed as slightly lower ones on which the parachute pack rests, the seat frameworks of the two types of seat being so proportioned that the overall height is the same in both cases.

Between the two cockpits, in the deck fairing, is a luggage compartment with a separate door, while in front of the forward cockpit is another and slightly smaller luggage space. Thus it is quite feasible to go touring on the "Widgeon III" and take sufficient luggage for ordinary requirements. The front cockpit is provided with a door on the starboard side, and as a small steel tube step is fitted to the lower longeron,

underneath the door, one can step into this cockpit without any climbing whatever.

The Wing.

The wing construction is of the perfectly straightforward type, with wooden box spars, spruce ribs and fabric covering. The ailerons, which run over the whole span of the wing, are of narrow chord, being hinged to an auxiliary spar, and are thus of high aspect ratio and claimed to be very effective while working very easily and with small forces on the control stick. They are operated by short cables running through the sides of the fuselage, the control crank being situated at the inner end of the aileron. Constructionally, the ailerons differ from the wings in being of metal construction, as are also all the tail surfaces. Duralumin and aluminium are the materials used, the tubular spar or leading edge of the ailerons being Duralumin, and the ribs of sheet aluminium. The wing section used is R.A.F. 34.

The wings hinge on the points of attachment of the rear spars to the centre section, and with the steel tube wing bracing employed, which is very rigid, no "jury struts" are required unless the machine is to be transported over long distances. The centre section of the wing contains the petrol tank, the high position enabling direct gravity feed to be employed, with consequent simplification of the petrol system. An extension handle pointing back from the tank enables the pilot to turn the petrol on or off from his seat. The petrol capacity is 15 gallons, and as the machine does an average of 20 miles per gallon, the range is about 300 miles.

Undercarriage

The undercarriage of the "Widgeon III" is of special type. The telescopic rear "legs" are of oval section steel tube. The load is taken by stout coil springs of steel, and bouncing is prevented by interposing between the two portions of the telescopic "legs" Ferodo dampers. This type of undercarriage is claimed to be particularly durable and robust, there being no rubber to perish, no air pressure to maintain, no glands to need attention.

Engine Installation

The engine installation in the "Widgeon III" is particularly interesting, and has been so planned that the whole engine unit can be removed after undoing four bolts, and, of course, the usual petrol leads, engine controls, &c. The engine

bed is of welded steel tubing, and two types have been standardised, one of which takes the "Cirrus II" engine and the other the Armstrong-Whitworth "Genet II." Owing to the difference in weight between the two engines, the centre of gravity would be slightly displaced by the substitution of one for the other. To counteract this, the Westland Aircraft Works employ the neat arrangement of standardising two centre-sections, one of which gives a slightly greater sweep-back to the wings than the other.

Load Factors

The Westland "Widgeon III" has been designed to give the required load factors for the British Air Ministry's "Aerobatic" Airworthiness Certificate with a total loaded weight of 1,400 lbs., and for normal flying the factors cover a loaded weight up to 1,600 lbs.

Specification

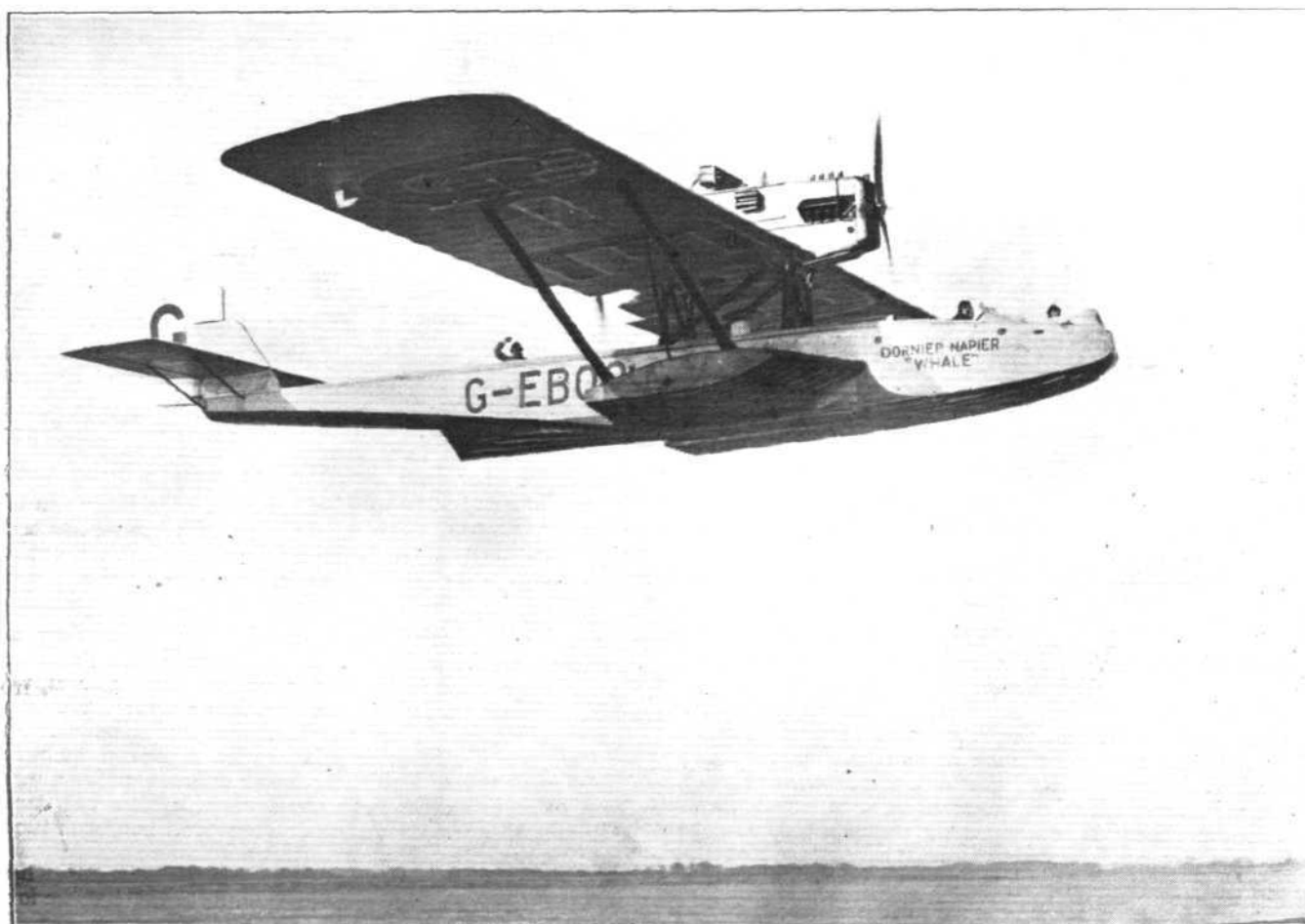
The main dimensions and areas are shown on the general arrangement drawings. Following are the main characteristics of the machine: Weight empty ("Cirrus II") 852 lbs.; ("Genet") 775 lbs. These figures are made up as follows: Wing, with bracing, centre-section, etc., 242 lbs.; tail 30 lbs.; fuselage and engine mounting, 240 lbs.; power unit exclusive of tanks, 240 lbs. ("Genet"); 321 lbs. ("Cirrus"); total weight of power unit, inclusive of tanks, petrol (113 lbs.) and oil (15 lbs.), 391 lbs. ("Genet"); 468 lbs. ("Cirrus"). Pilot, passenger and luggage, 420 lbs. Total loaded weight, 1,323 lbs. ("Genet"), 1,400 lbs. ("Cirrus"). These figures refer to machine with wooden propeller. If Fairey-Reed metal propeller is fitted 14 lbs. should be added.

As the machine has a wing area of 200 sq. ft., the wing loading is 7 lbs./sq. ft. with the "Cirrus" and 6.6 lbs. sq. ft. with the "Genet." The power loadings are

$$\frac{1,323}{72} = 18.4 \text{ lbs. h.p. and } \frac{1,400}{78} = 17.9 \text{ lbs./h.p. respectively.}$$

Performance

Following are the performances of the "Widgeon III": Top speed, 100 m.p.h.; cruising speed 85-90 m.p.h.; minimum speed, 42 m.p.h.; initial rate of climb, 560 ft. min.; service ceiling, 14,000 ft.; climb to 5,000 ft. in 11 mins.; to 10,000 ft. in 27 mins. 40 secs.



["FLIGHT" Photograph]

ANGLO-GERMAN CO-OPERATION : Capt. Frank Courtney making a test flight at Calshot on the Dornier "Wal," with Napier "Lion" engines on which he is hoping to attempt a flight from England to America and back. Unfavourable weather conditions are at present delaying the start.

The AIRCRAFT ENGINEER

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ENGINEERING
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EDITORIAL VIEWS

In the present number of THE AIRCRAFT ENGINEER two subjects are discussed: The handicap formula used in this year's race for the King's Cup, and the regulations for the Guggenheim Safe Aircraft Competition.

Mr. Mettam, who is now associated with Captain G. T. R. Hill in the development of the tailless "Pterodactyl" machine at the Westland Aircraft Works at Yeovil, goes into the logic (or otherwise) of the handicap formula which will be tested out near Nottingham on Saturday next. He points out that "even though the formula may give satisfactory results in this race, the curious assumptions which are hidden within it require careful consideration before it is adopted as a permanent standard, as there is grave danger of encouraging the building of freak machines to cheat the formula." So long as we use a formula there will, we are afraid, always be attempts made to "cheat" it. It is so in yacht racing, and there is no reason to believe that it will be otherwise in air racing. Nor are we at all certain that there is necessarily any great objection to "cheating" the formula, so long as the "cheating" tends in the right direction. The present formula tends to encourage the large span, and this in itself is probably not a bad thing, since large span, other things being equal, tends to improve take-off, climbing and ceiling. When the span is obtained by bringing wing tips to a point so as to get span without much addition of area, then the aerodynamic gain is probably not worth much, but in other respects span is worth having.

The Guggenheim Competition forces very many problems on the designer, and we have asked British designers to send us their views. Many of them have, with charming modesty, refrained from replying to our invitation. Others regret that, as their firm may enter machines, they would rather not make everybody else a present of their ideas. A few have, however, been good enough to give THE AIRCRAFT ENGINEER the benefit of their views, and the latter part of this week's issue is devoted to these letters. It will be seen that in general the opinion seems to be that a speed range from 35 m.p.h. to 110 m.p.h., although difficult to attain, is not regarded as impossible. Whether the type of machine which the competition may be expected to produce is likely to be a useful one is, perhaps, another thing.

HANDICAPPING BY FORMULA.

By H. A. METTAM, M.A., A.F.R.Ae.S.

The sport of air racing has many difficulties to face in attempting to gain a front place in the list of popular spectacles for the amusement of the general public. One only of these troubles forms the subject of the present article, that is the necessity for providing close finishes between machines of varying types and horsepowers. Handicap races are at their best somewhat unsatisfactory, and it would appear that the ideal to aim at is the organisation of races for "classes" of machines based on their engine horsepower, with a non-handicap race for each class. Victory in such races would depend purely on good design and skilful piloting and careful maintenance of engine. This ideal, if it be accepted as such, is obviously unattainable at the present time as the entries for any class except that covering the "Cirrus" II and the "Genet" would rarely be sufficient to make a show.

Handicapping then becomes essential, and the next question is what instructions should be given to the handicappers. Are careful design and aerodynamic efficiency to be penalised so that the worst machine may stand as nearly as possible an equal chance, or are the handicaps to be based on some mean value of overall efficiency with the intention that victory should go to the aircraft which surpasses that standard by the greatest margin?

We have stated above two broad alternative principles from which a choice must be made before any details can be considered. If the first is chosen, close finishes should be obtained, but there is little inducement to aircraft firms to bring out specially improved machines for racing purposes. Each newly modified machine may win one race and is then immediately handicapped back into the rack again. To obtain the result required by this first principle, it is evident that handicapping can only be done satisfactorily on known past performances of each type, with allowances for wind and small variations at the discretion of the individual handicapper. This system has been the one in vogue recently and has worked very well on the whole owing to the conscientious labours of a very small group of men whose skill and long experience enabled them to cope with the many problems involved.

If the second principle, that of giving free scope to aerodynamic merit, be chosen, the problem still bristles with difficulties, but it does at any rate hold out some hopes of a purely scientific solution, capable of straightforward application to a new machine on its first appearance. In other words a handicapping by formula becomes a possibility. Two formulae for this purpose have been published in FLIGHT,

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one on April 15, 1926, which was intended for use in the King's Cup race of that year, and the other on June 2, 1927, for the next King's Cup race to be flown on July 30. The first formula gave very satisfactory results, but has apparently not been used since the 1926 King's Cup race, while the second will be on trial for the first time on July 30.

The object of these notes is to consider the assumptions which have to be made in deducing handicapping formulae and to compare the two types of formulae mentioned above. The starting point for this investigation must be the standard equation for level flight.

$$V^3 = 73500 \times \frac{\eta}{k_d} \times \frac{HP}{S} \quad (1)$$

Where V = speed in m.p.h. at ground level.

η = propeller efficiency
 k_d = overall drag coefficient.
S = wing area in sq. ft.

This shows that for a given value of the "wing power," $\frac{HP}{S}$, the speed depends upon the quantity $\frac{\eta}{k_d}$ (this quantity will be recognised as twice the Everling "high speed figure")

$$\frac{\eta}{k_d} = 0.0314 - 0.228 k_L^2.$$

If we make the arbitrary assumption that $\eta = 0.7$ we get the further simplification:

$$k_d = 0.022 + 0.16 k_L^2.$$

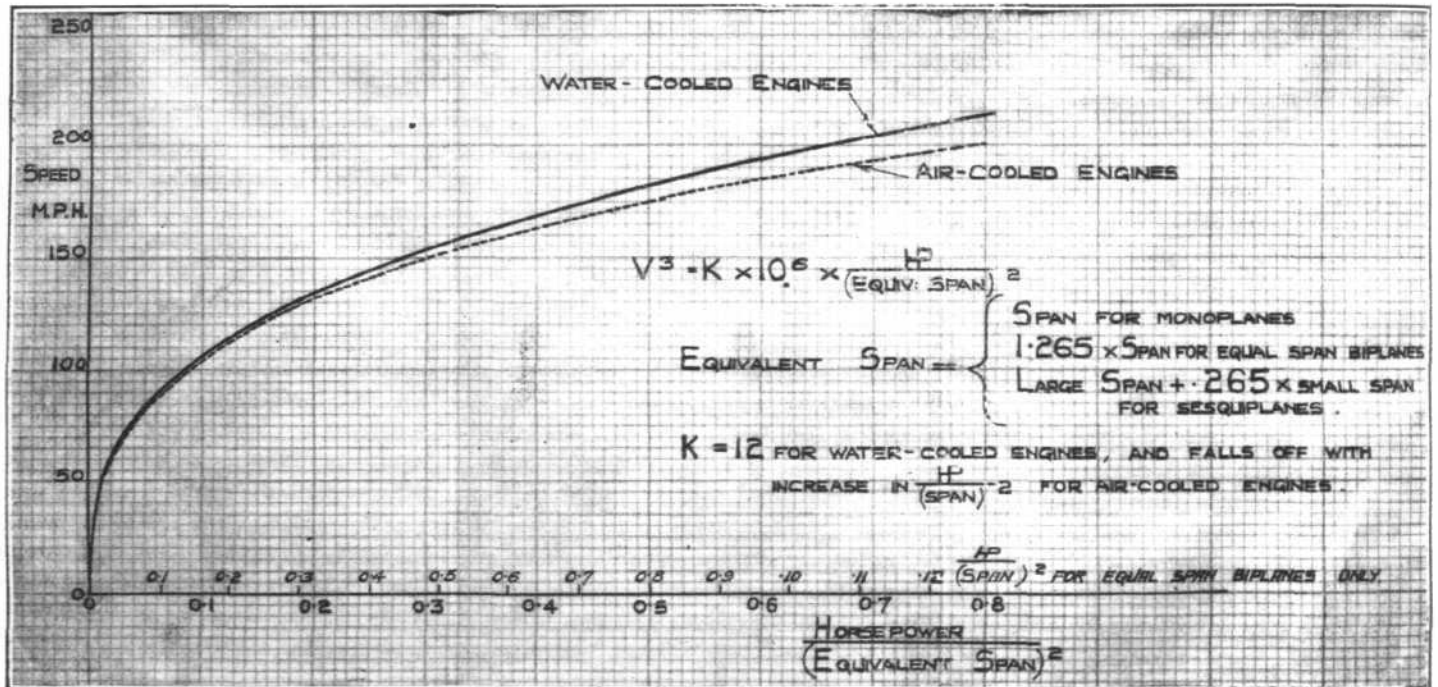
If profile drag = .005, k_R , coefficient for extra-to-aerofoil drag = .017.

From Mr. North's article on "Aircraft Performance," in the AIRCRAFT ENGINEER of April 29, 1926, we find that induced drag for a monoplane has the value

$$k_{Di} = \frac{2}{\pi A} \times k_L^2 \text{ where } A = \text{aspect ratio.}$$

If the whole of the k_L^2 term represents profile drag, $\frac{2}{\pi A} = 0.16$ or $A = 4$.

The aspect ratio for an equivalent biplane would be greater, but the correction due to gap/span is assumed to leave the induced drag the same. It is clear that the formula will underestimate the speed of a monoplane with aspect ratio greater than 4, and of a biplane with aspect ratio and gap/span giving



described by Prof. Everling in the AIRCRAFT ENGINEER of November 25, 1926, and reproduced in English units by the present writer in the AIRCRAFT ENGINEER of February 24, 1927). The most obvious basis for handicapping appears

therefore, to rest on the wing power and $\frac{\eta}{k_d}$ and this basis

was used in the first of the two formulae mentioned. In FLIGHT of April 15, 1926, will be found the formula,

$$V = F \sqrt[3]{\frac{\omega}{\lambda}}, \text{ with a curve of } F \text{ plotted against } V \sqrt[3]{\frac{\rho}{\omega}}.$$

$$\text{Since } \frac{\omega}{\lambda} = \frac{W}{S} = \frac{HP}{S}, \text{ this can be re-written}$$

$$V^3 = F^3 \cdot \frac{HP}{S} \quad (2).$$

By comparison with the fundamental equation (1) we get

$$F^3 = 73500 \frac{\eta}{k_d} \cdot F \text{ is assumed to vary with } V \sqrt[3]{\frac{\rho}{\omega}}, \text{ which in}$$

its turn is equal to $\frac{14}{\sqrt{k_L}}$.

Analysis of the curve given for F leads to the following basic equation:

a better induced drag than this monoplane. It is possible to gauge the importance of this term if we assume the highest value of k_L at which a lightly-loaded machine is likely to fly in a race. For example, the Bristol Brownie with a top speed of 70 m.p.h. and wing loading of 4.26 lbs. per sq. ft. flies at $k_L = 0.17$.

If we assume the extreme value of $k_L = 0.20$, k_{Di} for aspect ratio 4 = $.16 \times (0.2)^2 = 0.0064$, and overall k_d on this formula = 0.0284. If aspect ratio be increased to 8, $k_{Di} = 0.0032$, an improvement in overall k_d of about 13 per cent. and an increase in speed of 4 per cent. This increase would, undoubtedly, be somewhat reduced by increase of drag of bracing, and possibly by increase in profile drag due to a thicker section being required to accommodate suitable spars in a narrower chord. In most normal cases the value of k_L for top speed would be smaller and the possible improvement due to increase of aspect ratio very much less.

It is evident from inspection of the formula that increases in speed can also be obtained either by reduction of k_R through careful streamlining, or by reduction of wing area for the same horse-power. The latter can be achieved either by using a high lift wing section or by increasing the landing speed. It is important to note, however, that for the same body, a simple decrease in area does not lead to a directly proportional increase in V^3 . If S_1 be the original area and S_2 the new, and if extra-to-aerofoil drag is not altered by change in wing bracing,

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$$k_{D1} S_1 = 0.005 S_1 + 0.017 S_1 + 0.16 S_1 k_{L1}^2$$

and

$$k_{D2} S_2 = 0.005 S_2 + 0.017 \frac{S_1}{S_2} \times S_2 + 0.16 S_2 k_{L2}^2$$

must vary in a manner undeterminable without further assumptions, but if both k_{L1} and k_{L2} are in the neighbourhood of 0.1, we get

$$k_{D1} S_1 = 0.0066 S_1 + 0.017 S_1 = 0.0236 S_1$$

and

$$k_{D2} S_2 = 0.0066 S_2 + 0.017 S_1$$

Only 0.0066 out of 0.0236 or 28 per cent. of the original value of $k_D S$ has been reduced in proportion of the areas, the remaining 72 per cent. being unchanged.

In the new formula proposed for this year's King's Cup Race, the familiar quantity $\frac{HP}{S}$ has disappeared and in its

place we find $\frac{\text{Horsepower}}{(\text{Equivalent Span})^2}$.

The symbols in which the formula was given in FLIGHT of June 2, 1927, are non-standard, so perhaps it may be given here with the new symbol Sp for "equivalent" span, while the standard s is used for semi-span. We then write $V^3 = K \times$

$10^6 \times \frac{HP}{(Sp)^2}$ with $K = 12$ for water-cooled engines, while K for air-cooled engines varies according to a curve plotted against $\frac{HP}{(Sp)^2}$. "Equivalent" span for a monoplane is the

normal span, for a biplane with equal span wings, $Sp = 2s \times 1.265$ while for a sesquiplane $Sp = 2s_1 + 2s_2 \times 0.265$, s_1 being the greater span. Several queries immediately arise on inspection of these suggestions. Why use $(span)^2$ in place of wing area? What is the basis of the monoplane-biplane comparison? Why penalise the water-cooled engine?

Before investigating these points, we may take it for granted that any formula proposed by the committee appointed for this purpose does, in fact, "fit" the machines on which their investigations were based. The word "fit" is placed in inverted commas as it is clear that the formula is intended to under-estimate speeds, rather than to fit them accurately. Agreement with a selection of existing machines does not however, prove that a formula is fundamentally sound, as it may be possible by going outside the range of types considered to produce a machine whose speed would be hopelessly under-estimated, or alternatively that a good machine at the other end of the scale might be badly penalised.

The first question to consider is the use of $(span)^2$ instead of wing area. The reason for this choice appears to be that span is a characteristic of the machine which is very easily checked by the handicappers. Unless other advantages are obtained, this argument cannot carry much weight since the wing area of any machine must be known to the Airworthiness Department and could, if desired, be entered in the log book. This would apply not only to machines with airworthiness certificates, but also to special racing machines with certificates of exemption. For a monoplane with water-cooled engine the formula gives

$$V^3 = 12 \times 10^6 \times \frac{HP}{4s^2}$$

If A be the aspect ratio $A = \frac{4s^2}{S}$, and by substitution

$$V^3 = \frac{12 \times 10^6}{A} \times \frac{HP}{S}$$

By comparison with equation (1)

$$\frac{12 \times 10^6}{A} = 73500 \times \frac{\eta}{k_D}$$

$$\text{and hence } k_D = \frac{73500}{12 \times 10^6} \times \eta A = \frac{\eta A}{163}$$

The assumption implied in the formula is then that the overall drag coefficient varies directly as the aspect ratio.

This is a very peculiar result, which would not on any theoretical basis be expected to give good agreement when applied to a fair range of different types. Investigation shows, however, that the assumptions made do actually fit a considerable number of present-day machines. It is evident that a machine of large aspect ratio specially designed to race under this formula could beat most ordinary types, but it is not probable that any such machine will take part in the next King's Cup Race. Even though the formula may give satisfactory results in this race, the curious assumptions which are hidden within it require careful consideration before it is adopted as a permanent standard, as there is grave danger of encouraging the building of freak machines to cheat the formula.

Some direct evidence on the result of altering aspect ratio without any other change is available in R. and M. 859, "Lift and Drag of the Bristol Fighter with Wings of Three Aspect Ratios." The top speeds and weights of the machine in the three states are not recorded, but the speeds have been estimated from the drag curves given with assumptions as to the changes in wing weight. The alteration from the normal 7.72 aspect ratio to 9.73 gives a decrease of 5 m.p.h., against 8 m.p.h. from the formula, while the change from normal to 4.69 leaves the speed practically the same against an increase of 19 m.p.h. from the formula. The change from 4.69 to 9.73 is not likely to occur in normal design, but the figures show the extraordinary difference between actual and formula speeds for a really large change in aspect ratio.

The next point for consideration is the relation between monoplane and biplane. The case of the equal span biplane only will be analysed as the sesquiplane is not amenable to simple mathematical treatment. We have already obtained the equation for the monoplane in terms of wing power and

$$\text{aspect ratio, i.e., } V^3 = \frac{12 \times 10^6}{A} \times \frac{HP}{S}$$

For the equal span biplane, still with water-cooled engine, we have

$$V^3 = 12 \times 10^6 \times \frac{HP}{4s^2} \times (1.265)^2 = 12 \times 10^6 \times \frac{HP}{6.4s^2}$$

From the definition of aspect ratio, we get $A = \frac{8s^2}{S}$.

$$V^3 = \frac{12 \times 10^6}{A} \times \frac{HP}{6.4s^2} \times \frac{8s^2}{S} = \frac{12 \times 10^6}{(A \times 0.8)} \times \frac{HP}{S}$$

In other words, where aspect ratio is used in the formula for a monoplane (aspect ratio $\times 0.8$) should be used for an equal span biplane. This purely empirical relationship implies that a monoplane has a drag coefficient 25 per cent. higher than an equal span biplane of the same aspect ratio. If the two machines have the same extra-to-aerofoil drag, the fact that monoplanes generally have wings with a higher maximum lift coefficient, and, therefore, less area, would justify the greater value of k_D .

With regard to the last query raised, that of the different values of K for air-cooled engines, the evidence available to the writer is somewhat uncertain. Two examples may be quoted of machines which are substantially the same, except for a change from a water-cooled to an air-cooled engine. The formula underestimates the increase of speed between the Nimbus Martinsyde and the Jaguar Martinsyde, but over-estimates the similar increase between the D.H.50 with Puma, and the same machine with Jaguar. It will, however, be seen from the curves given in the figure that the difference between water-cooled and air-cooled does not become large in relation to the order of accuracy to be expected from the formula until high speeds are reached. The general arguments in favour of the two curves are that the decrease in weight, and therefore in wing area and wing drag, in using the air-cooled engine, are counter-balanced by the increase in engine and fuselage drag, and that this effect increases as the engine horse-power becomes greater.

The real worth of the latest formula will be demonstrated in the King's Cup Race two days after these notes appear in print. The use of the curves given in the figure will enable those interested to estimate the speed of a machine with the

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least possible arithmetic. On the results of this race the suitability of the formula for general use at all air meetings will have to be judged. Its adoption would definitely ease the labours of the handicappers, such questions as the difference in performance of the same machine as two-seater or single-seater being eliminated. All machines would naturally race as single-seaters with other cockpits covered up, and the production model with no special streamlining would no longer get any allowance over the cleaned-up racer. The question of windage allowances has not been considered, and it is not clear whether the proposal is to work rigidly to the formula, or whether the handicapper will still have to superimpose his corrections for wind on the formula figures. A strong wind in any direction on a triangular course is a severe handicap to the slower machines. It will be of great interest to see whether the formula, with additions as required, will give equality of opportunity to all types and lead to close finishes.

THE GUGGENHEIM COMPETITION.

IN last month's issue of THE AIRCRAFT ENGINEER we published some general speculations on the Guggenheim Competition by "Marco Polo." As the subject is one of considerable interest and of very great importance, we have written to the chief designers of the British aircraft firms, asking for their views on the regulations, the possibility or otherwise of complying with the regulations, and in general their opinions as to the type of machine which the competition is likely to produce. We regret that in many—indeed, in the majority—of cases, designers have refrained from expressing their opinion, generally because of the possibility that their particular firm might enter a machine. While this view is, perhaps, a very natural one, we cannot help thinking that Mr. North was right when, in connection with another subject, he pointed out that if, for instance, ten designers pooled their experiences, each would stand, on an average, to receive nine times as much as he gave. However, several chief designers have taken a broader view, and have sent us their contributions on the subject, as follows:—

MAJOR F. A. BUMPUS, Chief Designer of the Blackburn Aeroplane and Motor Co., Ltd., writes as follows:—

The conditions of the above competition, published in your issue of June 16, are of outstanding interest.

It is only to be expected that the conditions attaching to the award of such substantial prize-money should be severe, and the Committee may be congratulated on having set aircraft designers a real problem, both as regards stability and controllability and as regards performance.

As to whether the conditions can be successfully met within the next two years, it were rash to prophesy. The performance demanded implies a distinct advance on what has been so far achieved, and the safety requirements will certainly tax the skill of designers, but in neither respects are the stipulations fantastic.

Perhaps the most interesting considerations in a preliminary survey of the regulations are as to what are the characteristics needed in a machine to win most marks in this competition; whether such a machine is necessarily safe for general flying, and whether it would be a commercial proposition for civil aviation.

The problems of control and their possible solutions are a matter for detail study and experiment, and there can be no question that the qualities demanded are of value; consequently at the present stage their value may be assumed and attention be concentrated on the mark-winning part of the competition.

The datum point is a speed range of from 35—110 m.p.h., the achievement of which is an eliminating condition, and an analysis of the allocation of marks shows that out of a total of 200 marks, 34 are attached directly to low speed, 115 to a short run on landing, and 41 to a short run in getting off, but only 10 for any excess of high speed over the 110 m.p.h. demanded and that these ten are conditional upon having gained at least 24 of the 34 marks attached to low speed.

There are, of course, several factors concerned in ensuring

a short run either in landing or getting off, but in each case the dominating factor is a low stalling speed, and it becomes evident that the whole of the marks are in fact controlled by this factor.

Estimates of run, either getting off or landing, are a doubtful quantity, but maximum marks for slow speed flight are attached to a speed of 30 m.p.h., and the maxima under other heads appear to be arranged to correspond with this speed. Assuming this to be the case, the machine with a speed range of 30—110 m.p.h. may be regarded as eligible for 95 per cent. of the marks, the remaining 5 per cent. attaching to an increase in top speed from 110 m.p.h. to 115 m.p.h.

The low-speed figure is, of course, with engine on, and in determining wing loading some allowance is due for slipstream, but with the very extensive wings obviously indicated only a small percentage will be within the propeller disc, and the stalling speed in a glide will not exceed the figure of 32 m.p.h., which earns full marks for a slow glide.

Such an extreme speed range immediately suggests some form of variable aerofoil. There is, however, a stipulation that a machine may in certain circumstances be required to carry out all the tests at one setting of any such gear, and the entrant would need to be assured of the exact interpretation of this clause before committing himself to such a device.

Assuming, however, that by some acceptable means a maximum lift coefficient of 1 could be obtained in combination with a really efficient section for the high-speed end of the scale, the wing loading would be about $4\frac{1}{2}$ lb./sq. ft., while with the best constant aerofoils, the loading would be limited to about 3 lb./sq. ft.

Now, it is at least open to debate whether a machine so lightly loaded and capable of flying at some 30 m.p.h., is really a safe aeroplane.

The critical times in any flight are the few seconds when leaving and approaching the ground, and there can be no doubt that in a calm the slower the speed and the shorter the run, the less the danger, but the average condition is not a calm, nor even a steady wind, and the effect of gusts is greatly magnified with light wing-loading. In the case of a normal machine landing at 60 m.p.h., a gusty day with the wind varying, relatively instantaneously, between 20 and 30 m.p.h., would be one on which the pilot would need to be specially alert and on which getting off and landing were definitely less safe than in calmer weather.

Now the corresponding degree of uncertainty is reached in the case of a machine landing at 30 m.p.h. with a gusty wind varying between 10 and 15 m.p.h., and while the wind of 20-30 m.p.h. may only occur on 10 to 20 per cent. of the days of the year, a wind of 10-15 m.p.h. or more, probably occurs on 80 to 90 per cent. of the days of the year; moreover, in winds of 20-30 m.p.h., the lightly-loaded machine would be definitely unsafe.

It may therefore be said that on a few days the lightly-loaded machine is very safe, but that on the majority of days it would be much safer if the wing loading were higher.

This consideration bears very materially on the commercial possibilities of the type as the number of days of safe operation is materially reduced, and the standard of regularity essential for a scheduled service is sacrificed.

It must, however, be borne in mind that with any of the established types of variable aerofoil, the machine may be landed in windy weather with the gear at top-speed setting, in which case the landing speed would be nearer to 45 m.p.h. than 30 m.p.h., and the machine be, according to the above argument, proportionately safer.

Regarding the actual conduct of the competition, two or three points call for comment.

The first concerns the extreme difficulty of obtaining a really fair comparison of merit as regards stick and unstick tests due to inevitable variation of wind. Presumably these trials would be held with a very slight wind, but it is extremely difficult to measure any wind below 5 m.p.h., and the difference between no wind and a wind of 5 m.p.h. might easily represent half the total available marks in the case of such lightly-loaded machines, and the difference of 1 m.p.h. in wind speed

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on two test days might be the determining factor in a close competition.

A second point is that a taxiing test is specified in a wind of at least 20 m.p.h. Now, a wind exceeding 20 m.p.h. is very rarely even approximately a steady wind, and it would be a matter of luck whether or not the wind approached the stalling speed of the machine at a critical moment in this trial. The variable aerofoil machine would have an advantage provided it were allowed to have the aerofoil set in the top-speed condition, though it is at least conceivable that the taxiing test would be required to be carried out with the wings set as for the slow-speed trial, which after all is the normal taxiing condition.

Finally, it is stipulated that all tests shall be carried out by the Fund's pilots, and not by the entrant's pilot. This is presumably intended to ensure that the award is won by a machine rather than by a pilot, and so far as those tests are concerned, which are in the nature of eliminating trials little exception can be taken to this proviso: it would, however, be preferable that in case a machine fails in any such test, its failure should not be regarded as final if the entrant's pilot can demonstrate the machine's ability to pass that test. When, however, it comes to the actual mark-winning tests for the main prize, the position is different. Considering that 78 per cent. of the total marks are allotted to various stick and unstick tests, and that such tests are at least as much a matter of skilful piloting as of the qualities of the machine, it is inevitable that there will be considerable dissatisfaction among the unsuccessful competitors. For example, a delay of one second in lifting the machine in each of the unstick tests would involve an aggregate sacrifice of eight marks, which incidentally is all that can be gained by increasing the top speed from 110 to 114 m.p.h.

Now, if an entrant with his own pilot scores less marks than another with his nominee, he must accept defeat with a good grace, but the case is quite otherwise if he feels, perhaps with good reason, that the official pilot was not quite as quick as possible in picking up his machine, and so lost the critical few marks. With the best of goodwill and the best of good faith on the part of the official pilots, it is impossible to imagine that acute dissatisfaction can be avoided, and when a large money prize is at stake, it is more than desirable that the unsuccessful competitors should feel that the verdict is incapable of challenge.

MAJOR F. M. GREEN, Chief Designer of Sir W. G. Armstrong, Whitworth Aircraft, Ltd., contributes the following:—

Mr. Harry Guggenheim has written a preface to the rules of the Daniel Guggenheim competition. He points out in a frank and fair-minded way that the public must have confidence in the safety of flight before flying will become an ordinary means of transport. Mr. Guggenheim has, therefore, taken the advice of a large number of people connected with flying, who have helped him to draw up the rules of a competition for which a large prize is generously offered.

There are probably two ways in which attempts will be made to win the competition. The first is to design an aeroplane making use, on more or less standard lines, of all the aerodynamic information available. The second is to produce an altogether different sort of flying machine, such as the Cierva autogyro.

It is idle to guess what might be done in some entirely new way, but it is quite possible to consider what sort of an aeroplane might be designed in a conventional way to meet the rules of the competition. The slow speed tests mean that a loading of certainly not more than 7 lbs. a square foot is permissible. Unless Handley Page slots or similar devices are used the loading will have to be lighter than this. The top speed of 110 miles an hour is possible if the aeroplane has a low parasite drag, and the rate of climb of 400 ft. a minute will be easy to get. By far the most severe test seems to me to be the stop in 300 ft. over an obstacle 35 ft. high. The surest way to do this is to glide over the object completely stalled and to hit the ground without levelling up. This will mean a long travel landing gear, with a strong frame. It rather depends on the amount of deceleration that

the pilot can withstand. It might probably be worth while giving the pilot's seat a vertical travel in the aeroplane itself.

The stability requirements are severe, but I see no difficulty in designing an aeroplane to meet them. There is plenty of information available from the work carried out at Farnborough with combined slots and flaps to show that the tests are not unreasonable. Some of the conditions are rather vague, particularly those in paragraph 7, on the ability to recover from abnormal conditions. The flattest glide will be quite easy if the machine is able to do 110 miles an hour, and the steepest glide will be possible if the aeroplane is stalled to an incidence of about 25 deg.

In my opinion the rules of the competition have been ingeniously drafted, so that with present-day knowledge it is just possible to design an aeroplane to comply with the minimum conditions. I think that it is hardly necessary to demand a slow speed and a quick pull up on the ground, as the latter almost certainly includes the former.

I do not think that an aeroplane that just complies with the minimum conditions will be very useful as a transport machine. The loading of the planes is likely to make the machine uncomfortable in a wind and rather difficult to handle on the ground. A similar machine with a slightly heavier load would be more comfortable.

The promoters have certainly done their best to encourage the study of some important features of flying, and I hope that they will be duly rewarded by a good number of entries.

From MR. R. J. MITCHELL, Chief Designer of the Supermarine Aviation Works, Ltd., we have received the following:—

I have not looked into the Guggenheim Safe Aircraft competition in detail, but my general impression of the competition is as follows:—

The one predominating feature of the competition seems to me to be the low landing speed required. For a machine to stand any sort of chance of winning the competition it must have a landing speed of not more than 30 m.p.h. This means that the machine must have either very light wing loading, or be fitted with special contrivances such as slots. In either case it seems extremely doubtful if this low landing speed will increase the safety of the aircraft to any appreciable extent, and it will certainly have the effect of making the machines less comfortable to fly, of larger dimensions and, therefore, less easy to handle. Within practical limits it is just as dangerous to stall the machine at 30 m.p.h. close to the ground as at 40 m.p.h., and even if a machine is capable of landing at 30 m.p.h., an inexperienced pilot may try to land it at 28 m.p.h.

I am very strongly of the opinion that the safe aircraft of the future will not have a landing speed so low as 30 m.p.h., but will be at least as high as 40 m.p.h., and that forcing designers to produce machines at too low a landing speed will have a detrimental effect on general design.

Finally, MR. C. C. WALKER, director and chief engineer of the de Havilland Aircraft Co., Ltd., writes:—

The Guggenheim Competition demands a combination of qualities which is not found in any aircraft to-day. The question of whether existing and tried-out devices and components can be combined in a form which will produce a Guggenheim machine is an interesting one, as if this is not possible, some new invention or improved engine becomes necessary to satisfy the conditions.

Looked at as an ordinary, straight-forward aeroplane, the first difficulty is the speed range required. To fly in control at two different speeds, one of which is 3.15 times the other, while carrying 5 lbs. per horse-power of load, is probably beyond the capacity of any modern aeroplane. To fulfil the landing test, air and land brakes of some kind would, no doubt, have to be used, and their weight and resistance would have an adverse effect on the speed range, so that these requirements alone would make it very difficult for the ordinary aeroplane. Whether the use of high lift devices would make matters easier is difficult to say. They must—if they are to increase safety—either be automatic or

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extremely easy and simple to operate, and it must be remembered that, so far as high lift and low landing speed are concerned, these devices are always in competition with the alternative method of achieving the same object, namely, increasing the wing-chord.

There is another rather important point which arises when an attempt is made to decrease landing speeds below that given by a normally proportioned ordinary aeroplane. This is the fact that the lift/drag ratio is not only relatively bad, but is rapidly getting worse with increasing incidence, and the necessary change of flight-path just before landing is difficult to achieve. This is fundamental and applies to any high lift device. If this process is carried far, some form of "crash" undercarriage becomes necessary and adds a further something to weight, resistance and cost.

The best way of meeting all the requirements is, of course, not to be ascertained without much work and thought, but the situation may be summed up perhaps by saying that the speed range asked for (when taken with the other requirements) is the outstanding difficulty, always provided that it is not obtained by the sacrifice of some other desirable property.

The production of an aeroplane which is much easier to fly and allows perhaps time and space for errors of judgment to be corrected would have the effect of greatly enlarging the circle of users. Increased safety and confidence would then result from mass-experience obtained, this being an indirect and long-range effect of making it easier to fly. The young man on the motor-bicycle is running no more risk than the old gentleman who has recently bought a car; statistics might indeed show that the motor-cycle is safer, for although it calls for much more skill than the car, it does, in general, get more, and a tolerable all-round degree of safety is thus attained in the use of the road. This state does not seem to be reached until the general public come in as users.

This seems to be the way the promoters of the Guggenheim Competition are looking at aviation, and every one must be impressed by the public spirit and generosity they have shown in arranging it.

TECHNICAL LITERATURE.

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS.

WIND TUNNEL TEST OF AEROFOIL M.2.

By H. Davies, B.A., A.F.R.Ae.S., and F. B. Bradfield, Math. and Nat. Sci. Trip. Presented by the Director of Scientific Research.

R. & M. No. 1070 (Ae. 252) (3 pages and 2 diagrams).
October, 1926. Price 4d. net.

A number of wing sections have been tested in the American Variable Density Wind Tunnel, and it is desired to get some comparative tests between the model and full-scale work in this country and the experiments in that tunnel. Certain models have been sent to America which have already been tested. The present experiments relate to an M.2 symmetrical thin wing section already tested in the National Advisory Committee for Aeronautics Wind Tunnel.

Lift and drag have been measured on an 8 in. by 48 in. monoplane at speeds of 60, 80 and 90 ft. per sec. and the centre of pressure determined at 60 and 80 ft. per sec.

The main characteristics at $LV = 40$ are

k_L max.	k_D min.	k_M at no lift	(L/D) max.
0.36	0.0048	0	16.4

The aerofoil is to be tested full-scale on a Bristol Fighter and comparative tunnel tests will be made on a model of the aeroplane.

WIND TUNNEL TESTS OF AEROFOIL R.A.F. 34.

By H. Davies, B.A., A.F.R.Ae.S. Presented by the Director of Scientific Research.

R. & M. No. 1071 (Ae. 253) (3 pages and 2 diagrams).
October, 1926. Price 4d. net.

R.A.F. 34 is derived from the symmetrical wing R.A.F. 30 by using a reflexed centre line of 0.02 camber. The wind tunnel tests on the sections R.A.F. 30 to R.A.F. 33 are described in R. & M. Nos. 928* and 946.†

Lift and drag have been measured at speeds of 60, 80, and 90 ft. per second, and the centre of pressure determined at 60 and 80 ft. per second on an 8-in. by 48-in. monoplane.

The main characteristics at $LV = 40$ are :—

k_L max.	k_D min.	k_M at no lift.	(L/D) max.
0.505	0.0059	— 0.005	19.4

The centre of pressure varies very slightly from the position 0.25 C. over the greater part of the normal flying range.

This aerofoil is to be tested full-scale on a Bristol Fighter, and comparative tunnel tests will be made on a model of the aeroplane.

* R. & M. 928. Test of four thick aerofoils R.A.F. 30, 31, 32 and 33.—By F. B. Bradfield and A. S. Hartshorn, R.A.E.

† R. & M. 946. The theory of the design of aerofoils, with an analysis of the experimental results for the aerofoils R.A.F. 25, 26, 30 to 33.—H. Glauert, R.A.E.

PRELIMINARY EXPERIMENTS ON TWO-DIMENSIONAL FLOW ROUND BODIES MOVING THROUGH A STATIONARY FLUID.

By PROFESSOR B. MELVILL JONES, M.A., A.F.C., W. S. FARREN, M.B.E., and FLIGHT-LIEUT. C. E. W. LOCKYER, R.A.F.

R. & M. No. 1065 (Ae. 247). (12 pages and 22 diagrams.)

November, 1926. Price 1s. 6d.

A considerable study of flow past bodies in a small water channel has been carried out at the National Physical Laboratory and described in R. & M. Nos. 58*, 76† and 332.‡ In these cases the models were supported at a fixed point past which a stream of water flowed. The main objection to this method is that the water channel becomes turbulent when the Reynolds number exceeds a certain value.

Experiments have been made elsewhere with a model moving through still water having a free surface.§ The present tank at Cambridge University was constructed for carrying out work of a similar nature. Preliminary experiments have been made at a Reynolds number of 10^4 which it is hoped will be extended to numbers as high as 5×10^5 . This is comparable with the wind tunnel range for wings, but the full-scale is greater and of the order of 10^7 .

A number of photographs illustrate the preliminary experiments on cylinders and aerofoils, the exposures being sufficiently short for tracks at some little distance from the model to be treated as vectors. They represent the motion of a sphere and an aerofoil starting from rest. The motion was made visible by the use of oil drops suspended in the water before the model was moved. Further experiments are to be conducted at higher speeds to find the type of motion resulting from the commencement of movement of an aerofoil at various angles of incidence, and for other purposes.

Diagrams illustrate the method of lighting and the type of seal used to prevent water leaking past the movable attachment to which the model is fixed.

* Investigation by visual and photographic methods of the flow past plates and models.—Eden. (R. & M. 58.)

† Photographic investigation of the flow round a model aerofoil.—Reff. (R. & M. 76.)

‡ Vortex motion.—Naylor and Frazer. (R. & M. 332.)

§ Ahlborn, Naturwissenschaftliches Verein Hamburg, Vol. XVII, 1902. (See also Science Abstracts, 1902, No. 430.)

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THE GLOSTER "GORAL"

Bristol "Jupiter" or Siddeley "Jaguar" Engines

So accustomed has one become to think of the Gloster Aircraft Co., Ltd., as producers of single-seater fighters only that one is apt to lose sight of the fact that a good many other types have been designed and built by that firm. That Mr. H. P. Folland, chief designer and engineer of the company, has specialised on single-seaters is, perhaps, not sur-

that some five or six years ago Mr. Folland designed a freight aeroplane which in many ways was much ahead of its time, and had features which to this day have not yet been put into practice. More recently he designed a modern goods carrier with a very high pay load for its power, while of service types one may recall the "Goring" general purpose



"FLIGHT" Photograph

THE GLOSTER "GORAL" : Three-quarter front view. The engine is a Bristol "Jupiter."

prising when one remembers how closely he has been associated with that type for many years, from the old S.E.5 of the Royal Aircraft Factory (as it then was), through the various British Nieuport "Nighthawks" and Gloster "Goshawks," "Grebes," "Gamecocks," "Gorcocks," etc., not to mention the single-seater racers, aeroplanes, and Schneider

machine and the "Goral" two-seater reconnaissance and bombing machine. There are others to which no reference may be made, but sufficient has been said to indicate that, when the demand arises, the Gloster Aircraft Company is prepared and able to produce an aircraft of any type.

The subject of these notes is the Gloster "Goral," a two

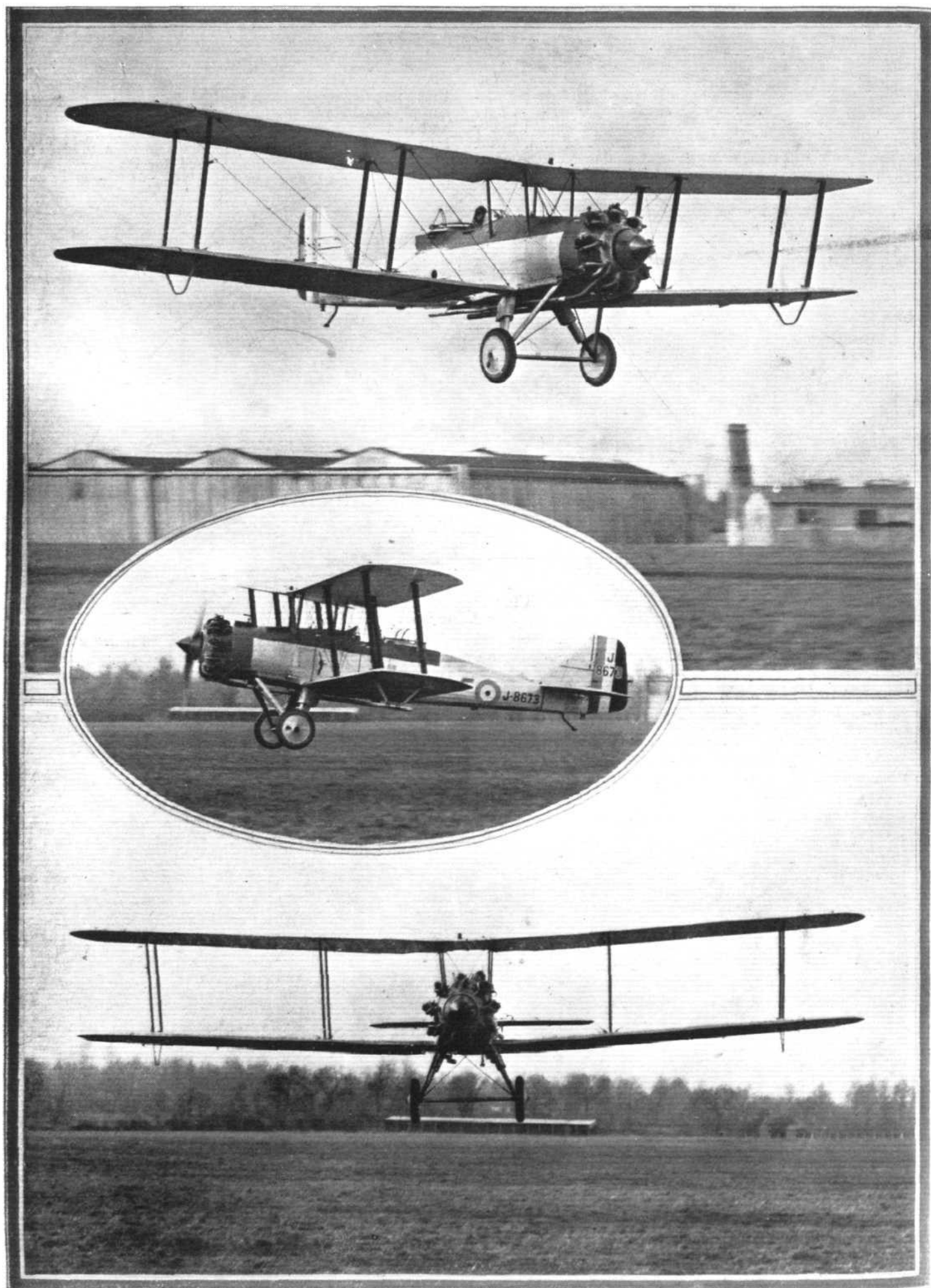


"FLIGHT" Photograph

THE GLOSTER "GORAL" : Three-quarter rear view.

Cup seaplanes, bearing the Gloster name. There is thus good excuse for linking the name of Gloster with the single-seater type of machine. It is, however, just as well not to overlook the fact that while specialising on the small, fast machine, the Gloster Company has not done so to the exclusion of very different types. For instance, it may be recalled

seater reconnaissance and bombing machine fitted with air-cooled engine. Owing to the fact that it is a service machine and is still on the "Part publication" list, it is not permissible to say much about it, other than what may be gathered from an examination of the accompanying photographs.



[" FLIGHT " Photographs]

THE GLOSTER "GORAL" BRISTOL "JUPITER" : Three views of the machine in flight, piloted by Flying-Officer Howard Saint, D.S.C.

A feature of the machine which is not apparent in the photographs is the fact that the "Goral" is an all-metal machine, and more specifically an all-steel construction. The Gloster company, like nearly all the British firms, have for some time now been developing their own forms of metal construction, and in the "Goral" this is employed throughout the structure, the only part not made of metal being the covering, which is of the normal doped fabric kind.

Although a detailed description of the Gloster metal construction is not permitted, it may be mentioned that this form of construction has been made use of in the "Goral" to incorporate a somewhat unusual feature. Thus the fuselage consists of three separate units, which can readily

complete with petrol tanks and fully equipped cockpits; (3) the rear portion, with tail skid assembled and control cables threaded through their guides, ready for joining up to the controls and tail surfaces.

Another very interesting feature of the "Goral" is that the designers have kept prominently in mind the question of repairs in countries where facilities for specialised metal-work are lacking. To this end, all joints have been so designed that it is possible to replace a damaged steel member by a wooden one, and the Gloster company is prepared to supply to purchasers of this machine particulars of appropriate wood members of the correct size for any place in the machine. Thus, a purchaser who would like to acquire all-metal aircraft,



THE GLOSTER "GORAL" : Side view.

["FLIGHT" Photograph]

be dismantled for transport purposes, when each unit requires a packing case of very moderate dimensions only. This is naturally a great advantage where a purchaser of these machines has to have them delivered by rail or steamer, and this feature should, in itself, do much towards giving the "Goral" due consideration in placing an order. When it is further pointed out that many of the units of the machine, including the wings, are interchangeable with the corresponding ones of the de Havilland type 9A, it will be seen that the new machine becomes an attractive proposition in countries that have already standardised the D.H.9A.

The three separate fuselage units are: (1) the front portion, with engine installed, complete; (2) the middle portion,

but is deterred by the problem of repairs, can be assured that this need not prevent him from ordering his machines, since not only can he obtain steel tube spares from the makers, but also, should he prefer, he can carry out more or less temporary repairs by replacing damaged parts by wood members. All tubes and fittings are rustproofed inside and out, and soldering of joints has been avoided, the fittings being detachable, so that repairs can be easily carried out with quite simple workshop equipment.

Unfortunately, it is not at the moment permissible to give performance figures of the Gloster "Goral," but it may be stated that the cruising range, fully loaded, is approximately 750 miles (1,200 kms.).

The "Schoolgirl Pilot"

SAID to be the youngest qualified air pilot in the world, Lillian Dawson, an American schoolgirl, arrived in Liverpool on July 24 en route for Paris, bearing wreaths for Madame Nungesser and Madame Coli from the Pittsburgh Press Club.

The Mishap to Sarmiento de Beires

FURTHER to our report in a recent issue of FLIGHT regarding the sudden termination to the big flight made by the Portuguese pilot, Sarmiento de Beires, we have received from the Dornier Co. information as to the cause of the accident. It appears that before he started, the wings of his Dornier-Wal flying boat were damaged, and, against the advice of the manufacturers, were repaired in a somewhat haphazard manner. As a result, when flying off the coast of Brazil, the covering became loose, necessitating the forced landing previously reported.

Royal Air Force Flying Accidents

THE Air Ministry regrets to announce that as the result of an accident in the vicinity of Chang Chan Island, Hong Kong, to a Fairey Flycatcher seaplane of No. 403 (Fleet Fighter) Flight (China Station) on July 12, Flying Officer (Honorary Flight-Lieutenant) Leonard William Hennell Phillips, the pilot and sole occupant of the aircraft, is reported missing, and is presumed killed.

As the result of an accident at Camberley to a Bristol Fighter machine of No. 13 (Army Co-operation) Squadron, Andover, on July 18, Pilot-Officer William Horace Shorter, the pilot of the aircraft, and No. 362994, A. C. 1 Leslie Rogers, were killed.

As the result of an accident at Aboukir, Egypt, to a D.H.9a machine of No. 4 Flying Training School, Abu Sueir, on July 19, No. 86779, Corporal Reginald William Richard Robins, the pilot and sole occupant of the aircraft, was killed.

PRIVATE



FLYING

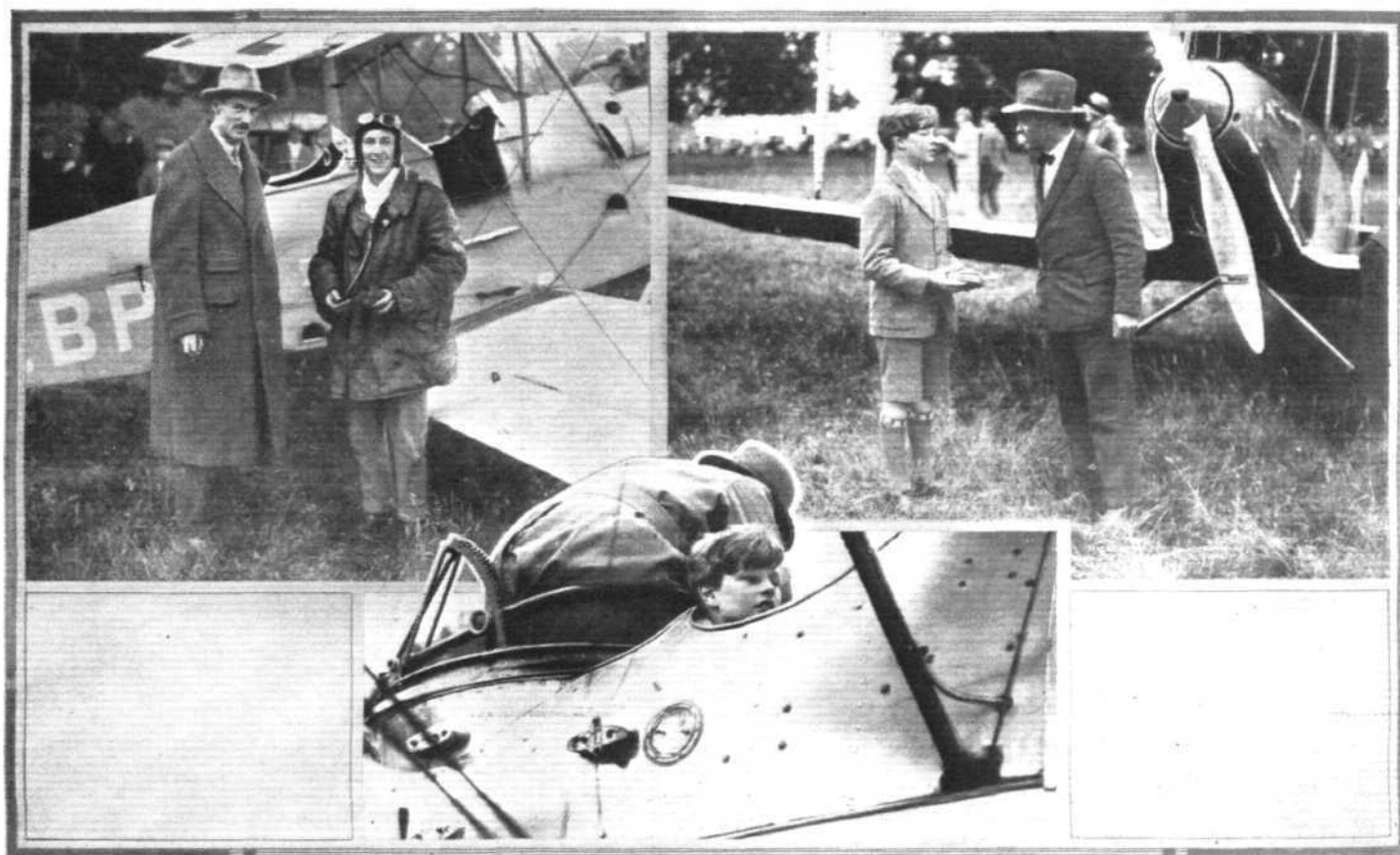
A Section of **FLIGHT** in the Interests of the Private Owner, Owner-Pilot, and Club Member

THE MARCHIONESS TOWNSHEND'S AERIAL FÊTE

An aerial fête was held at Raynham Park, Fakenham, Norfolk, surrounding Raynham Hall, the seat of the Marchioness Townshend, on July 23. It was organised for the purpose of assisting the Norfolk and Norwich Aero Club and also in response to the appeal of the Lord Mayor of Norwich to help local hospitals. The Marchioness Townshend entertained to luncheon a large party, among whom were the visiting pilots who arrived at the fête in their own machines. These included the Hon. Lady Bailey in her "Moth," Lord Ossulston in his "Moth," Col. The Master of Sempill flew a D.H.51, Mr. M. L. Bramson an S.E.5A, Capt. H. Broad and Capt. Lines flew "Moths," Mr. B. Hinkler, an "Avian," Wing Commander

Small hydrogen balloons were released and had to be burst by collision with the machines, the maximum time for each entrant being 5 mins. and the winner being the pilot who burst his balloon in the shortest time.

Capt. Lines gave a demonstration of walking on the wing of a machine piloted by Squad-Leader Rea. Mr. Bert Hinkler was to have given an exhibition of aerobatics on his Avro "Avian," but this was cancelled owing to a damaged wheel. Capt. Broad kindly offered him the loan of a "Moth" wheel, but it would not fit. Capt. Broad then took the event, stunting his "Moth." Flight-Lieut. Pynches went up in a Boulton and Paul P.9, piloted by Squad-Leader Rea and



["FLIGHT" Photographs]

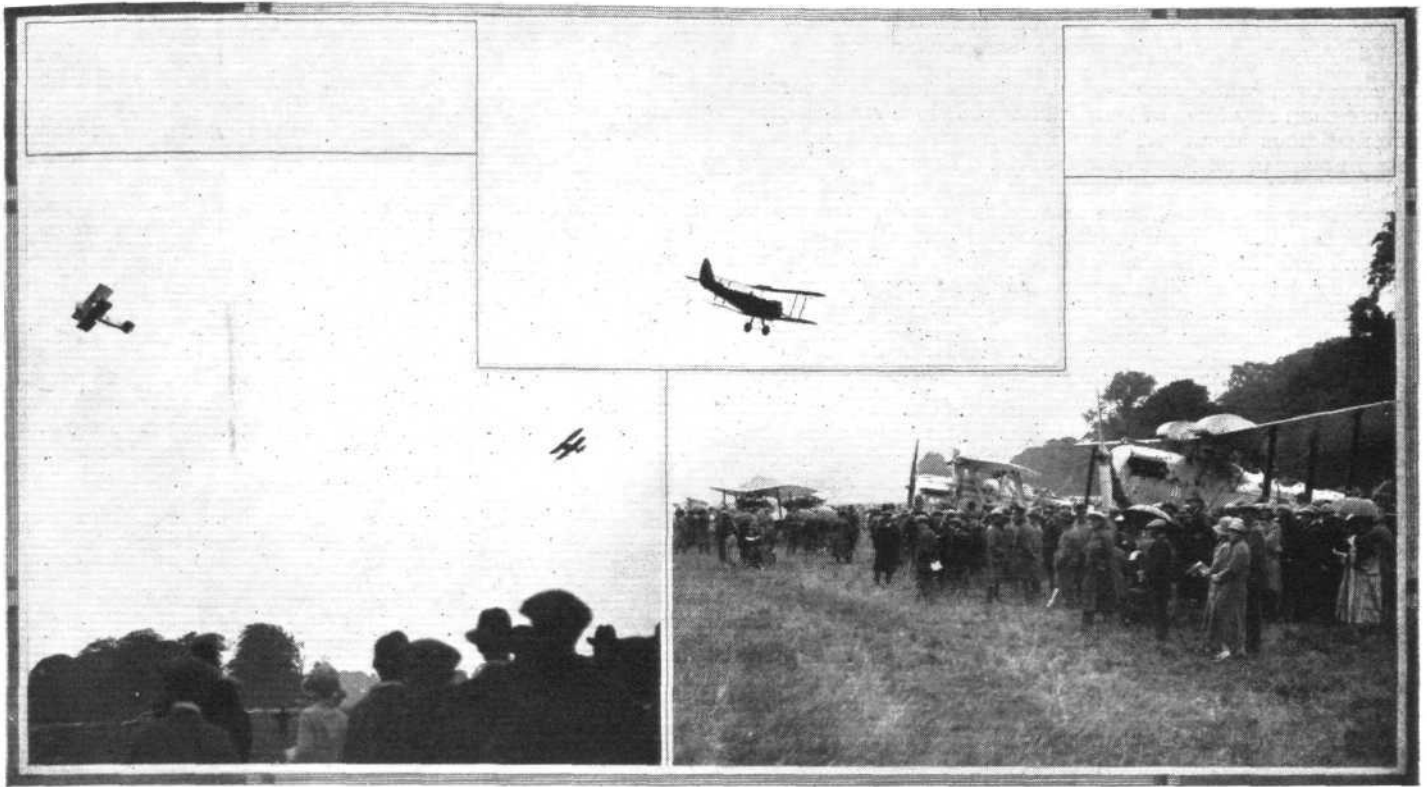
THE MARCHIONESS OF TOWNSHEND'S AERIAL FETE : In the left picture is Lord Ossulston (in flying gear) with the Lord Mayor of Norwich, Mr. C. R. Bignold, whom he flew back to Norwich to keep an appointment. On the right is the young Marquis of Townshend selling a programme to Mr. Bert Hinkler, and he is also seen below, a little too short for the Fairey "Fawn," cockpit.

H. Blackburn, a "Moth," Squadron-Leader C. Rea and Flight-Lieut. F. O. Soden flew P.9's, and Flight-Lieut. D. V. Carnegie, a D.H.53. The Lord Mayor of Norwich Mr. C. R. Bignold, was there, and after lunch he was flown back to Norwich by Lord Ossulston in order to keep a public engagement. The young Marquis Townshend was very busy selling programmes. A very interesting and varied programme had been drawn up but it was unfortunately marred by very bad weather, an incessant rain falling throughout the afternoon. The first event at 3 p.m. was to have been a demonstration of sky writing by Mr. M. L. Bramson or a mock aerial fight. Owing to the bad weather it was the latter that was chosen, a Gloucester "Gamecock" and a Vickers "Venture", piloted by Flight-Lieut. Pope and Flight-Lieut. Jenkins, engaging in a sham fight. Next followed a balloon-bursting competition for visiting pilots, three prizes being awarded,

carried out an interesting display of aerial fireworks. There were other spectacular events scheduled, but the weather was pitiless, and in these circumstances this novel aerial fête might reasonably have been far more disappointing. The R.A.F. Band from Felixstowe gave selections of a popular taste, by kind permission of Wing-Commander R. B. Maycock, O.B.E., and officers. It was conducted by Sgt. W. J. McConnell.

Apart from the visiting pilots the guests included Lord Saye and Sele, the Hon. Antonia Benson, Capt. and Mrs. Cator, Capt. and Lady Norah Bentinck, Capt. Pike, Lady Charles FitzRoy, Lady Harmond-Græme, and officers of the 5th Battalion Norfolk Regiment.

The officials for the fête were Capt. Pike, Squad-Leader Rea, Squad-Leader Woodhouse, Capt. Ramsey, Mr. Whitlock, Mr. Pickthorn and Mr. Martin. Capt. King and Capt. Moore were the announcers.



"FLIGHT" Photographs

THE MARCHIONESS OF TOWNSHEND'S AERIAL FETE: On the left is the mimic battle between the Gloucester "Gamecock" and the Vickers "Venture." In the centre is the "Moth," piloted by Capt. Lines, chasing balloons. On the right, the crowd inspect the machines.



"FLIGHT" Photographs

Raynham Hall, the seat of the Marchioness Townshend, in Raynham Park, Norfolk, where the Aerial Fete was held in aid of the local hospitals and the Norfolk and Norwich Aero Club. Distinguished visitors are seen returning to the Hall for afternoon tea.

Mrs. Elliott-Lynn Flies to Ireland

CONTINUING her air travels, Mrs. Elliott-Lynn has now flown her new "Avian" to Ireland. On July 25 she left Woodford at 11 a.m. and reached Flint half-an-hour later. She crossed to Ireland by the short sea route and arrived at Belfast at 3 p.m. Later she got to Dublin where a landing was made in Phoenix Park, and where a welcome awaited her by Free State Officers. This flight was undertaken with the object of demonstrating the attributes of the "Avian" light plane to those interested in the proposed Irish Flying Club.

The Scottish Flying Club's Aerodrome

WE are informed by the Secretary of the Scottish Flying Club Movement that notification has been received from the Air Ministry agreeing to the use of Renfrew Aerodrome in the event of the proposed Scottish Flying Club maturing. The permission is of a temporary nature, and the favour has been granted owing to the fact that the various sites that might be considered would require at least 12 or 15 months' attention before they could be made usable. The terms and conditions are yet to be arranged, but the foregoing intimation considerably lightens the work of the committee.

A SEARCH FOR LANDING GROUNDS

AN aeroplane, when functioning, requires less land for its purpose than any form of land vehicle, but it is none the less very fastidious about the land that it does require. It is quite human in its likes and dislikes. It does not like to land in trouble any more than man does. It likes a nice smooth path in life. Where to land is of such concern to an aeroplane that it only proves that its natural sphere is in the air. The land is the only limitation to its freedom. It can fly where it will, but it cannot land where it will. Before an aeroplane sets off it wants to know where it can land, and failing that knowledge, its subsequent landing is haphazard and probably dangerous. With the increase of private flying in this country there is an obvious need for a thorough air survey to determine all existing landing areas. These must be charted and become the possession of all

ford, Manchester, at 3.20 a.m., and followed a triangular course over England, flying until 9.27 p.m. the same night. By 9 a.m. she reached the South Coast, having visited thirty places, including Sealand, Shrewsbury, Birmingham, Gloucester, Yeovil and Bournemouth. By noon Manston, near Ramsgate, was gained, and Stag Lane, Edgware, at 2 p.m. The course subsequently passed through Bedford, Norwich, Nottingham, Leeds and Newcastle. She had not anticipated flying farther north than Woodford, but the "Avian" was flying so well that she decided to carry on to Newcastle, where she arrived at 9.27 p.m., landing on the Cramlington aerodrome. Mrs. Elliott-Lynn said that no mishap occurred during the whole day. The weather was perfect, and the machine behaved excellently, maintaining an average speed of 80 m.p.h. She made 79 landings and

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A Useful Flight:  
Mrs. Elliott-Lynn  
beside her new  
machine, an Avro  
"Avian,"  
Mk. II, at the  
Woodford Aero-  
drome, from  
which she started  
on her 1,200-mile  
flight at dawn on  
July 19, making  
79 landings on  
the way and  
finishing the  
same night at  
Newcastle.  
~~~~~



private owners. Until such a chart is made private flying may be limited to some extent in its range over the country. One or two unsatisfactory experiences will keep private owners to common paths of flight. At the moment the only information becoming available is that gathered from the experiences of private owners, and only then when they do not keep their information to themselves. It is, therefore, only a casual survey that we are getting, and, left to this method, it will be years before a chart can be compiled. Last week, Mrs. Elliott-Lynn completed a very interesting flight that served more than a mere personal accomplishment in providing some very useful information towards this problem of landing grounds.

Mrs. Elliott-Lynn purchased an Avro "Avian" (Mk. II) recently and on July 19 she left the Avro aerodrome at Wood-

ford, Manchester, at 3.20 a.m., and followed a triangular course over England, flying until 9.27 p.m. the same night. By 9 a.m. she reached the South Coast, having visited thirty places, including Sealand, Shrewsbury, Birmingham, Gloucester, Yeovil and Bournemouth. By noon Manston, near Ramsgate, was gained, and Stag Lane, Edgware, at 2 p.m. The course subsequently passed through Bedford, Norwich, Nottingham, Leeds and Newcastle. She had not anticipated flying farther north than Woodford, but the "Avian" was flying so well that she decided to carry on to Newcastle, where she arrived at 9.27 p.m., landing on the Cramlington aerodrome. Mrs. Elliott-Lynn said that no mishap occurred during the whole day. The weather was perfect, and the machine behaved excellently, maintaining an average speed of 80 m.p.h. She made 79 landings and

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.
Bristol and Wessex Aeroplane Club, Yate, Gloucester. Sec., C. S. Clarke, Channel Road, Walton Park, Clevedon, Somerset.
Hampshire Aeroplane Club, Hamble, Southampton. Sec., Maj. Ross White, Hamble, Southampton.
Lancashire Aero Club, Woodford, Lancs. Sec., C. J. Wood, Oakfield, Dukinfield, near Manchester.
Midland Aero Club, Castle Bromwich, Birmingham. Sec., Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-upon-Tyne Aero Club, Cramlington, Northumberland. Sec., A. H. Bell, c/o The Club.
Norfolk and Norwich Aero Club, Moushold, Norwich. Sec., H. O. Bennett, 5, Opie Street, Norwich.
The Scottish Aero Club Movement, 101, St. Vincent Street, Glasgow. Sec.: Harry W. Smith.
Suffolk Aeroplane Club, Ipswich.—Secretary, Courtney N. Prentice, "Hazeldeil," Stowmarket, Suffolk.
Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Sec., J. F. Barnes, 39, Swan Arcade, Bradford.

LONDON AEROPLANE CLUB

FLYING time.—The total flying time for the week ending July 23 was 40 hrs.
Pilot Instructors:—Capt. F. G. M. Sparks and Capt. S. L. F. St. Barbe.
Dual Instruction:—P. Hall, Lord Douglas Hamilton, P. G. Whalley, G. M. Randall, H. S. Greenland, Dr. Cook, S. O. Bradshaw, P. Drysdale-Smith, L. Rowson, E. Richards, Miss Black, E. M. Broderick, S. H. Simon, W. L. M. O'Connor, Miss Spooner, A. Pollard, C. E. Murrell, R. B. Tucker, J. Bickley, M. O. McKenzie, E. L. Clarke.
Solo Flying:—R. Sanders Clark, N. J. Hulbert, C. H. Swan, W. Roche Kelly, Major K. M. Beaumont, V. G. Leader, M. Wright, J. H. Saffery, C. M.

Jackaman, S. O. Bradshaw, A. H. M. Lees, M. W. Ballantyne, J. J. Hofer, C. E. Murrell, J. G. Crammond, Miss O'Brien, O. J. Tapper, R. M. S. Veal.
Passenger Flights:—Miss Fowkes, Miss Ferris, G. H. Wilson.
Tests for Aviators' Certificates:—Mr. A. J. Richardson passed the tests for his Aviator's Certificate on July 19, which happened to be his 60th birthday. Miss Spooner also passed the tests for her Aviator's Certificate on July 18.
Nottingham Meeting:—The Club will be sending D. H. "Moths" GEBLI and GEBNY and "Bristol" Brownie GEBJM to Hucknall, to take part in the various races on Monday, August 1, 1927. The following members have been selected as pilots:—Miss O'Brien, O. J. Tapper, L. J. C. Mitchell, Capt. H. Spooner.

HAMPSHIRE AEROPLANE CLUB

Report for week ending July 17.—Total flying time, 30 hrs. 5 mins.; instruction flying, 12 hrs. 55 mins.; solo flying, 15 hrs.; joy riding, 1 hr. 5 mins.; test flights, 1 hr. 5 mins.

Sunday of this week proved to be a record day for this club for flying time, the total for the day being 9 hrs. 30 mins. There was no flying on Wednesday or Thursday owing to heavy rain throughout both days.

The following members had instruction with Flight-Lieut. Thomson:—Commander A. W. Hunt, Capt. H. T. Molyneux, Lieut.-Commander Woodhouse, Vicomte J. de Sibour, Miss M. M. Home, Messrs. T. F. Brewster, J. Dunning, B. Whittle, D. A. R. Cripps, M. K. Bayne, A. R. Mellor, W. P. Courtney, W. T. J. Stanford, Everett, Evans, Southcliffe, and Dickson.

The soloists were Don J. de la Cierva, F.O. W. L. Dawson, K. P. L. Bowen, Lieut. P. D. Oliver, R.N., F.O. Southey, Flight-Lieut. Crawford, the Hon. H. K. Grosvenor, V. F. Nicholson, E. A. L. Parker, D. L. Rumble, A. N. Other, Shepherd, Everett and E. T. Symmons (our temporary member from the London Club). Incidentally, we believe that Mr. Symmons is the first member of a flying club to become a temporary member of a club other than his own under the agreement arrived at during the last meeting of the Grand Council of Associated Flying Clubs.

Miss Liegh, Miss Willison, Mr. Grahame Gibbs, Mr. Liegh, Mr. Eburn, and Mr. H. Brady had joy rides with Flight-Lieut. Thomson; Mrs. Waterman, Mr. H. Brady, Mr. A. R. Mellor, Mr. Eburn, Mr. Gillet, Mr. Collins, with Mr. K. P. L. Bowen, who is now our joy riding assistant to our instructor; Lieut. Oliver, R.N., took up Mr. Havers and Mr. Newman; Mr. E. T. Symmons took up Miss Symmons, Miss Potter and Mr. Loveday. Mr. Mair went up with A. N. Other.

Flight-Lieut. Crawford flew up to Birmingham in one of our "Moths" on Saturday to represent this club at the Midland pageant, but was told that he could not take part in the racing as he was not there in time to be verified. To have fulfilled this condition would have necessitated leaving Hamble on Friday afternoon, and would therefore have seriously interfered with instruction and club flying. A club possessing only two aeroplanes can ill afford to spare one machine at the week-end even for one day, so we would suggest to the Midland Club that they alter this condition for future years. The opinion of other clubs on this point would be interesting. Mr. McCracken accompanied Flight-Lieut. Crawford on this trip.

On Sunday evening, a gentleman who had been spending the day on the mainland and wished to return to his residence in the Isle of Wight, missed the last boat back to Cowes. As it was quite imperative that he should get home that night, he came to the club and asked if he could be flown across to the island. This was arranged by enrolling him as a day member, and Mr. K. P. L. Bowen took him over to Cowes, landing at Messrs. S. E. Saunderson's aerodrome. The flying time for the double journey to Cowes and back was 25 mins. The steamboat takes just over one hour each way.

Report for week ending July 24.—The weather has been very unsuitable for flying this week, gales being prevalent on four days and also a certain amount of rain.

In addition to this, our Mark II engine in G—EBOI developed serious internal complaints on Wednesday. It was removed immediately, and our spare Mark I engine substituted.

Total flying time for the week: 12 hrs. 40 mins. Instruction flying 7 hrs. 20 mins. Solo flying: 3 hrs. 50 mins. Joy riding: 50 mins. Test flights: 40 mins.

The following members had instruction:—Messrs. Evans, 90 mins.; N. K. Baynes, 40 mins.; Crook, 35 mins.; W. M. Wall, 35 mins.; T. F. Brewster, 35 mins.; Dickson, 30 mins.; Williamson, 25 mins.; B. B. Henderson, 25 mins.; A. H. Greasley, 20 mins.; D. A. R. Cripps, 20 mins.; B. Whittle, 20 mins.; J. Dunning, 20 mins.; Boillot, 20 mins.; Fagan, 15 mins.; and Wing Commander Willie, 10 mins.

The soloists were Flying Officer Dawson, 40 mins.; K. P. L. Bowen, 40 mins.; E. T. Symons, 35 mins.; Shepherd, 30 mins.; Lieut. P. D. Oliver, R.N., 30 mins.; Flight Pilot Southey, 20 mins.; V. F. Nicholson, 15 mins.; R. H. Cooper, 10 mins.; and Flying Officer Odbert, 10 mins.

Miss Rouse, Mrs. Rouse, Mr. S. Gavin, Mr. E. D. Symonds and Mr. Symonds, Senior, all had joy rides with Flight-Lieut. Thomson; Mrs. Crook and Mr. R. H. Chaffey, with K. P. L. Bowen; Mr. Frost with E. T. Symmons and Miss Rouse and Mr. E. D. Symonds with Flying Officer Dawson.

LANCASHIRE AERO CLUB

Report for week ending July 23. Total flying hours, 34 hrs. 55 min. made up as follows: Dual, 17 hrs. 25 mins.; solo, 7 hrs. 25 mins.; joy-rides, 8 hrs. 45 mins.; Test flights, 1 hr. 20 mins.

Dual with Mr. Brown: Messrs. Hollindrake, Riley, Harber, Parker, Meades, F.O. Brunton, Williams, Ruddy, Watson, Torres, Linaker, Shiers, Sykes,

Hope, Jowett, Tweedale, Allott, Caldecott, Kinsley, Nelson, Anderson, Costa, Leeming, Fisher, Patrieux and Miss Baerlein.

Dual with Mr. Cantrill:—Messrs. Hollindrake and Caldecott.

Dual with Mr. Scholes:—Messrs. Nelson, Lacayo, Williams and Will Hay. Solo:—Messrs. Nelson, Lacayo, Musgrave, Chapman, Costa, Rowley Agar, Leeming, Will Hay, Michelson and F.O. Brunton.

Joy-rides:—With Mr. Brown: Messrs. Mills, Gorton, Dixon, Corless, Smethurst, Stafford, Rosebloom, Marshall, Williams, Phillips, Mrs. Elliott Lynn, Mrs. Knight, Mrs. Smethurst and the Misses Fowler and Foxhall. With Mr. Scholes: Messrs. Brimelow, Knight, Hicks, Bowden, Lewis, and the Misses Corless and Dickson. With Mr. Cantrill: Messrs. Freeman, Gorton Robinson and Richards; Mrs. Freeman, Mrs. Brimelow, Mrs. Marshall, Mrs. Bowden, Mrs. Jackson, Mrs. Robinson. With Mr. Lacayo: Messrs. Bennett, F. Scholes, Taylor and Lees, Mrs. Bennett and Miss Bennett. With Mr. Hay: Mr. Iles, Miss Reel and Miss Griffin.

On Saturday the 23rd, members of the Press Club were the guests of the Lancashire Aero Club for tea, after which some two dozen of them took joy-rides, thereby, let us hope, increasing the air-mindedness of the Press and its wife.

As anticipated, the Avian is proving extremely popular and is in great demand. We should be in a bad way at the moment without it, for LV ("Moth") and OK ("Avro") are both out of action for complete overhaul and only MQ is serviceable apart from the "Avian."

The week has been considerably enlivened by the presence of two members of the Club who are not often with us, namely Mrs. Elliott Lynn and Mr. Will Hay. What with one of them emulating a grasshopper (*vide* Press reports) and the other making Hay while the moon shines things have been quite cheery.

MIDLAND AERO CLUB LIMITED

Report for week ending July 23.—The total flying time was 15 hrs. 2 mins.

The following members were given dual instruction by Mr. McDonough:—Capt. J. E. Brewin, R. D. Bednell, G. Robson, R. Cazalet, R. L. Brinton, L. H. Lee, N. Crane, H. Beamish.

Solo:—H. J. Willis, S. H. Smith, R. L. Jackson, E. J. Brighton, C. Fellowes, G. V. Perry, W. Swann.

Passenger flights:—L. V. Mann, R. Aspinall, A. B. Aston, F. L. Harvey, Mrs. McDonough, V. De Satge, S. G. Hall.

The Club will be closed over next week-end as a large number of members have decided to go to the Nottingham Meeting.

Mr. McDonough is flying a Westland "Widgeon III" ("Cirrus Mark II") in the King's Cup Race.

NEWCASTLE-UPON-TYNE AERO CLUB

Report for week ending July 24.—Total flying time: 44 hrs. 30 mins. Instructor: J. D. Parkinson.

The following members flew solo:—Messrs. R. N. Thompson, Turnbull, Irving, D. Wilson, A. Bell, H. Ellis Shaw, Thirlwell, C. Thompson, Jewett, Pargeter, Elmes, Stawart, Bainbridge, Maxwell.

The following members received instruction:—Messrs. McDougal, Rasmussen, Thirlwell, Shaw, A. Bell, Lawson, Gibson, Stawart, Pargeter, Maxwell, Heaton, D. Wilson, Bainbridge, Jewett, Gibson, Fairless.

It was omitted to mention in last week's report that Mr. L. C. Davey was launched on the 13th. Putting up a very good show. This week, Messrs. Thirlwell, and Maxwell were launched, both putting up very excellent shows. Mr. Maxwell only received a total of 5 hrs. dual. Sunday was a record for the Club; 16 hrs. 15 mins. being put in. Hardly any flying was possible on Wednesday or Thursday owing to continuous rain.

YORKSHIRE AEROPLANE CLUB

Report for week ending July 23.—Total hours flown, 27 hrs. 20 mins.; hours flown dual with Mr. Beck, 18 hrs. 40 mins.; hours flown solo, 4 hrs. 05 mins.; cross-country flights, 3 hrs.; joy rides, 1 hr. 30 mins.; tests, 5 mins.

The following took dual with Mr. Beck:—Miss Watson, Messrs. Leatham, Hirst, Yeoman, Lister, Wall, Dr. Ling, Brown, Crouther, Wilson, Ellison, Capt. Milburn, Sproule, Mann, Tenbos, Dawson, Micklethwait, Weaver.

The following flew solo:—Messrs. Wilson, Mann, Dawson, Wood, Wayman, Coles, Norway.

On Monday, C-EBRZ, Capt. Milburn's new machine, was brought safely to Sherburn by Mr. Beck and Capt. Milburn, and is of great service to the club during G-EBNN's temporary absence.

Mrs. Elliott-Lynn landed on her Avro Avian G-EBRS on Wednesday, doing a tour of the aerodrome.

Capt. Broad and Mr. St. Barbe landed on Sunday morning to replenish their supplies of petrol, and oil before continuing a circuit of the King's Cup course.

Dennis Rooke Re-starts After All

MR. DENNIS ROOKE, who set out from Croydon for Australia so unostentatiously on his newly-purchased "Moth" "Marjorie," and came to grief when landing at Karachi, doing considerable damage to his machine (as reported in FLIGHT for July 14), has apparently started again. He reached Allahabad from Cawnpore on July 24, landing on the way on a sandbank in the Middle Ganges.

Wireless and Private Flying

THE Marconi Wireless Company has carefully considered the use of wireless in private aeroplanes and has come to the conclusion that in this early stage of private flying the apparatus is hardly necessary. There are various reasons apart from this, one being that the present light aeroplane allows very little margin for wireless equipment, for the extra weight would be appreciable, and there is not the necessary accommodation unless the passenger is dispensed with. But this is with regard to the existing Marconi combined transmitting and receiving set, known as Type AD. 6, which weighs about 100 lbs. when installed. Such sets are used on Imperial Airway liners and other air liners, as well as on military machines. What will be required when there is a market for it is a smaller, lighter and cheaper set, essentially designed for the light aeroplane. There is nothing to warrant the cost of designing and producing such a set now. In these

circumstances, if a private owner particularly wants wireless in his machine to-day, his only alternative is to use a receiver alone, with which he could intercept weather reports passed from the existing aerodrome stations by telephone. It would be possible to supply standard aircraft receivers suitable for this purpose, but it is difficult to decide whether the owner would consider he had sufficient value from such an installation unless he did a considerable amount of touring on the regular Continental air routes. So far there have been no enquiries from private owners about wireless.

R.M. Groves Memorial Prize Essay Awards

THE awards in the 1926 competition for the R. M. Groves Memorial Prizes, which are open to all members of the Royal Air Force, for an essay on "Forecast of Air Development," are as follows:—

1st Prize.—Flight-Lieut. E. J. Kingston-McCloughry, D.S.O., D.F.C., Directorate of Technical Development, Air Ministry.

2nd Prize.—Squadron-Leader L. L. MacLean, Aircraft Park, India.

3rd Prize.—Squadron-Leader J. L. Vachell, M.C., Directorate of Organisation and Staff Duties, Air Ministry.

Special Prize.—Flight-Lieut. F. W. Walker, D.S.C., A.F.C., No. 10 Group, Coastal Area.

The Memorial Essay prizes were established by the family of the late Air Commodore R. M. Groves, C.B.E., D.S.O.

AIR DEFENCE MANŒUVRES

By MAJOR F. A. DE V. ROBERTSON, V.D.

Two years ago, as special correspondent of FLIGHT, I was privileged to attend the great army manœuvres in September, when four army divisions and a cavalry division fought for four days round Andover. Then, of course, the chief interest of FLIGHT was to observe the work of the squadrons of the Royal Air Force which were allotted for co-operation with the army, namely the four regular squadrons which specialise in army co-operation, namely Nos. 2, 4, 13, and 16, strengthened for that occasion by a flight raised by the School of Army Co-operation at Old Sarum and by Nos. 25 and 56 Fighter Squadrons and Nos. 39 and 297 Bombing Squadrons—the latter being day bombers using the D.H.9.A. with 400 Liberty engine. The main conclusions come to as a result

will endeavour to spot them and ascertain their numbers and altitude. An elaborate system of reporting and collating the reports should enable the defence H.Q. to plot out the direction of each invading formation. The guns and searchlights will endeavour to bring the enemy down or to turn him back. Here we may pause to remark that the guns employed will belong to the Territorial Army, and that it is an obviously weak point in our defence scheme that responsibility for air defence should be divided between two departments of State instead of being concentrated under one command. In principle this is wrong; even though relations may be, and, we believe are, both close and cordial between the air and the military authorities. A change of personnel might produce

The "Eastland" Forces.

Squadron No.	Home Station.	Aeroplane.	Engine.	Squadron Commander.
DAY BOMBERS (Single engined).				
11	.. Netheravon	.. Horsley	.. 650 Condor	.. Sqdn.-Ldr. E. A. B. Rice, M.C.
12	.. Andover ..	.. Fox ..	.. 430 Felix	.. Sqdn.-Ldr. T. E. Salt, A.F.C.
39	.. Spittlegate	.. D.H. 9.A.	.. 400 Liberty	.. Sqdn.-Ldr. H. V. Champion de Crespigny, M.C., A.F.C.
207	.. Eastchurch	.. D.H. 9.A.	.. 400 Liberty	.. Sqdn.-Ldr. J. P. Graham, M.C.
NIGHT BOMBERS (Twin engined).				
7	.. Bircham Newton	Virginia..	.. 450 Lion	.. Wing-Com. C. F. A. Portal, D.S.O., M.C.
9	.. Manston ..	.. Virginia..	.. 450 Lion	.. Wing-Com. C. C. Durston.
58	.. Worthy Down	.. Virginia..	.. 450 Lion	.. Sqdn.-Ldr. A. T. Harris, O.B.E., A.F.C.
99	.. Bircham Newton	Hyderabad	.. 450 Lion	.. Wing-Com. B. E. Smythies, D.F.C.

of studying those manœuvres were (1) the paramount necessity to the army of an air arm, even in bad weather and over a heavily wooded terrain, and (2) the lamentable shortage of army air squadrons, which necessitated the borrowing of four squadrons from Air Defences of Great Britain. It was remarked at that time that if the Air Defence Force were to be engaged on an air campaign it would be unable to lend a single squadron to the army, which, especially when all the divisions were in the field, would be left absolutely blind.

This week the Air Defence Force is engaged on an air campaign, the first actual air manœuvres ever held in any country on a large scale. Again, the first impression created is the shortage of air squadrons; but in this case a definite programme of expansion is in existence and in operation,

a less happy state of affairs, and this ought to be made impossible.

It is fully expected that determined bombing pilots will frequently, if not usually, force their way through the gun fire, though they may suffer casualties in doing so, and then they will have to face the last and most effectual form of defence, our fighter squadrons. That is not to say that the fighters will hold their hands till the last moment. We may expect that they will try to meet the enemy as far away from his objective as possible. But of course their tankage does not give them the same range and endurance which the bombers enjoy. They will to some extent suffer from a lack of the power of initiative which is imposed by any system of defence. It is always the attackers who can choose the ground

The Defence Forces.

Squadron No.	Home Station.	Aeroplane.	Engine.	Squadron Leader.
1	.. Tangmere ..	.. Siskin ..	.. 385 Jaguar ..	.. E. D. Atkinson, D.F.C., A.F.C.
41	.. Northolt ..	.. Siskin ..	.. 385 Jaguar ..	.. F. Sowrey, D.S.O., M.C., A.F.C.
56	.. Biggin Hill ..	.. Siskin ..	.. 385 Jaguar ..	.. C. H. Elliott-Smith, A.F.C.
111	.. Duxford ..	.. Siskin ..	.. 385 Jaguar ..	.. G. W. Roberts, M.C.
3	.. Upavon ..	.. Woodcock ..	.. 400 Jupiter 4 ..	.. J. M. Robb, D.S.O., D.F.C.
17	.. Upavon ..	.. Woodcock ..	.. 400 Jupiter 4 ..	.. J. Leacroft, M.C.
23	.. Kenley ..	.. Gamecock ..	.. 450 Jupiter 6 ..	.. R. Collishaw, D.S.O., O.B.E., D.S.C., D.F.C.
32	.. Kenley ..	.. Gamecock ..	.. 450 Jupiter 6 ..	.. R. B. Mansell, O.B.E.
43	.. Tangmere ..	.. Gamecock ..	.. 450 Jupiter 6 ..	.. A. F. Brooke
19	.. Duxford ..	.. Grebe ..	.. 385 Jaguar ..	.. H. W. G. Jones, M.C.
25	.. Hawkinge ..	.. Grebe ..	.. 385 Jaguar ..	.. W. H. Park, M.C., D.F.C.
29	.. Duxford ..	.. Grebe ..	.. 385 Jaguar ..	.. R. H. G. Neville, M.C.
24	.. (Communications), Northolt	Avro ..	.. 110 Le Rhone ..	.. W. H. L. O'Neill, M.C.
		Bristol Fighter	.. 275 Falcon ..	
		D.H. 9.A. ..	.. 400 Liberty ..	

and the "General Idea" has been framed to take into consideration the present incompleteness of that expansion.

The exercises which are taking place this week are intended to test, not the efficiency of our bomber squadrons in attacking enemy objectives (of which hostile aerodromes will certainly be the first targets) but the efficiency of our plans for defending London by combined use of ground observers, anti-aircraft guns, searchlights, and fighter squadrons. The four squadrons of day bombers belonging to Air Defences of Great Britain (but not the Special Reserve and Auxiliary Air Force Squadrons) and the four squadrons of night bombers will all take part in the exercises. They will represent the enemy, our old and hated enemy "Eastland." Their function is to act as living targets for the guns and the fighter squadrons. Their attacks will take place by day and by night, and will always be directed from beyond the sea coast against the various sectors of the London defences. Watchers on the coast (special constables will be employed as far as possible)

or the particular tract of air for a battle, and the fighter squadrons must observe the limits of the sector to which they are allotted.

These squadrons, when we may regard them as friendly, constitute the Wessex Bombing Area, which is commanded by Air Vice-Marshal Sir John Steel, K.B.E., C.B., C.M.G.

The defence, of course, is entrusted to the Fighting Area, under the command of Air Vice-Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C.

The "General Idea" is as follows: Prior to Monday, July 24, "Eastland" had bombed the capital of "Westland" (London) to such an extent that the Government had retired to Manchester, taking with it part of the London defences. (N.B.—The part thus taken away is the number of squadrons not yet raised and those territorials who are not available for participation in these exercises.) "Eastland" is anxious to prevent a complete concentration at Manchester, and has detailed nine bombing squadrons to hold the remainder of the

London defences to their ground. The "Eastland" intelligence department is aware of the system of sectors of defence, and the bombers are instructed to attack in each sector in turn, in order to prevent the withdrawal of any more defence fighter squadrons.

The control of the operations is being exercised on Monday, Thursday, and Friday by Air Marshal Sir John Salmond, K.C.B., C.M.G., C.V.O., D.S.O., A.D.C., Air Officer Commanding-in-Chief Air Defences of Great Britain. On Tuesday and Wednesday the respective commanding officers of the Fighting Area and the Wessex Bombing Area are conducting their own operations under the general supervision of the C-in-C.

Warfare commenced at 6 a.m. on Monday, 25th. The day was bright, and to ordinary earth-dwellers was in pleasing contrast to the weather throughout most of July. But up to 8 a.m. there was a layer of clouds at 2,000 ft. which later broke up into moving masses with clear gaps in between. These conditions became almost ideal for day bombers. They could take cover among the clouds, though they were forbidden to fly through them for fear of collisions, while the gaps often permitted them to take deliberate aim at their objectives. The two objectives to-day were the Duke of York's Headquarters at Chelsea, and the R.A.F. Store Depot at Kidbrooke. At each objective there was situated a mobile camera obscura and an umpire, who was able to decide whether a bomb would have hit the objective. An umpire also accompanied each bombing formation.

Thanks to the weather conditions the hostile bombers met with considerable success in the morning in reaching their objectives. In the afternoon, however, they all suffered heavy casualties, though they were not always aware of this until after their return to their aerodromes. In all, eight raids took place on Monday, as follows:—

(1) No. 11 Bombing Squadron (Horsleys) crossed the coast near Havant at 8.14 and attacked Chelsea at 9.30. The target was obscured by low clouds. The ground umpire observed them only 300 yards distant from the target. No. 41 Fighter Squadron (Siskins), which was sent up against them, failed to intercept them on account of the clouds.

(2) No. 12 Bombing Squadron (Foxes) was reported over Beaconsfield at 9 a.m., and at 10 it attacked Chelsea from a height of 15,000 ft. The target was obscured by clouds. No. 32 Fighter Squadron patrolled for two hours but failed to find the enemy.

(3) No. 207 Bombing Squadron (D.H.9A's) crossed the coast at Shoeburyness at 8 a.m., but the raid was unsuccessful on account of the clouds.

(4) No. 12 Bombing Squadron (Foxes) came in near Bognor at 12.4 and at 13.08 attacked Chelsea from 8,000 ft. It suffered severe casualties from anti-aircraft fire, and the umpire, owing to the clouds, could not report the result of the bombing. Nos. 43 (Gamecocks) and 17 (Woodcocks) went up to intercept it, without result.

(5) No. 39 Bombing Squadron (D.H.9A's) came in over Ipswich at 11.10, but on account of the thick weather turned back again. When the weather improved later four of the bombers returned and attacked Kidbrooke from 10,000 ft. The clouds saved them from interception by the fighters.

(6) No. 99 Bombing Squadron (Hyderabad's) crossed Aldeburgh at 13.45. At 14.04 they were caught over Great Sampford by No. 19 Fighter Squadron (Grebes), and again at 15.47 over New Cross by No. 56 Fighter Squadron (Siskins), which at the time was hunting another formation. The Hyderabad's returned to earth blissfully ignorant of their fate, and reported a most successful raid.

(7) No. 11 Bombing Squadron (Horsleys) got over Chelsea at 15.07, and a ground umpire reported that they had bombed Acton, the bombing being accurate. No. 17 Fighter Squadron (Woodcocks) patrolled for two hours without finding them.

(8) No. 207 Bombing Squadron (D.H.9A's) came in over Hastings at 14.40, but were intercepted and attacked over Ashford at 15.17 by No. 25 Fighter Squadron (Grebes).

The above is the gist of a summary issued on Monday evening by the authorities, and it may be modified and expanded by later information.

The system of reporting from the ground worked very well, and in the various control rooms the progress of each bombing formation was plotted out on large maps. Many useful lessons were learnt by the authorities during the day, and it was not held that the early success of the invaders proved that there were flaws in the system of defence. For one thing, the whole of that system was not in operation.

The searchlights were manned in some places by Territorials, and in others by the Regular Army. As darkness came on, interest in their operations became active. But after a lovely afternoon heavy clouds came on at nightfall and the operations for the night were cancelled.

The Air Ministry made excellent arrangements for helping the special correspondents of newspapers to get a grasp of the exercises. Group-Capt. R. C. M. Pink, C.B.E., and Wing-Comdr. W. L. Welsh, D.S.C., A.F.C., conducted the correspondents round Northolt, Uxbridge, Kenley and Biggin Hill, showed them squadrons taking off on patrol and squadrons coming in from raids, took them into several control rooms, and explained the system at work, and showed them also (by the courtesy of Maj.-Gen. E. B. Ashmore, C.B., C.M.G., M.V.O.) the operation of the searchlights.

Unfortunately there was one fatality. When No. 17 Fighter Squadron was coming in to land, two Woodcocks collided, and Flying-Officer Ian A. Anderson was killed. The machine caught fire and was burnt out on Northolt Aerodrome.

Tuesday, "Somewhere in Westland"

Yesterday I devoted my attention almost entirely to the fighting area. To-day was given to studying the Wessex Bombing Area, i.e., "Eastland." It meant wandering far and wide, and (considering that air transport was not available) interesting and instructive visits to Netheravon, Andover and Uxbridge did not constitute a bad day's work. Uxbridge is not exactly a station of the Wessex Bombing Area, but it is always a useful place to visit when manœuvres are on. I was very sorry that time did not admit a visit to Worthy Down as well, but there is a limit to the lateness of hour at which newspapers will accept copy.

But before dealing with to-day, let me finish the story of last night. It was not until 22.45 that the C-in-C. decided to cancel operations owing to the thickness of the clouds, which began to roll up at sunset. The fighter squadrons were then aground, as they are never ordered to go up until a raider is reported to be heading for their sector. But there were already 12 night bombers in the air, all working individually. Eight of them were "Virginia's" from Nos. 9 and 58 Bombing Squadrons, and four were Hyderabad's belonging to No. 99. All squadrons had some stories to tell when their machines came home. Worthy Down became enveloped in thick fog and the machines of No. 58 were warned not to return there without further instructions. However, the weather presently cleared, and "Bill Bailey" came home. One of the Hyderabad's had a forced landing owing to minor engine trouble, but the pilot put it down quite safely on the coast near Felixstowe. When the wireless "Cease Fire" was sounded, two of the "Virginia's" of No. 9 were already over London; so they went through the motions of bombing their helpless objective, whose umpire had presumably gone to bed, before flying back to Manston.

There was one more little comedy of the Lindbergh type, which perhaps evidences the growing air-mindedness of our people. During the night operations all the emergency landing grounds were illuminated, but one of them was so overrun by enthusiastic spectators that it became useless, and a wireless warning to that effect was sent out to the bombers.

To-day the fortunes of war were varied, and the tale of slaughter grew. At 7 a.m. a flight of Horsleys of No. 11 B. Squadron left Netheravon and came in over Bexhill at 8.45. They got to Kidbrooke, duly bombed it, and also took a photograph to prove that they had actually got there and seen it. They returned cock-a-hoop, but the squadron was mightily disgusted to learn later that No. 32 F. Squadron had, all unbeknown to the bombers, caught them near Tonbridge Wells, and had shot all three Horsleys down. I saw another flight of No. 11 take off soon after 13.00. It was a smart piece of work. At the sound of the klaxon three raiding machines and a spare were run out of the hangar, the Bristol gas starters got busy on the Condors, and dummy bombs were hung in the racks. The first machine was all ready in 2½ minutes. The bombs were unloaded again before the flight took off. This flight found the weather impossible, and after some 20 minutes returned again and landed. The raid was a failure. Another raid, one by No. 39 B. Squadron, was also completely defeated by the weather. So far all had gone well for the defence. But the "Foxes" of No. 12 B. Squadron turned the tables. They came in at Bognor at 9.30, and, aided by the clouds, got right over Chelsea and duly bombed it. No. 41 F. Squadron failed to intercept

(Concluded on page 530.)

AIRISMS

FROM THE FOUR WINDS

The Canadian Transatlantic Attempt

ACCORDING TO *The Times*, Captain Maxwell and Captain Tully, who are proposing to fly from London (Ontario) to our London, have not yet received the sanction of the Ontario Government for the flight. The Premier, Mr. Ferguson, taking a similar view to that of the Minister of Lands and Forests, contends that the forest wealth of the Province is of more importance than any Transatlantic trip. He thought that if the two pilots could be spared for two months in these dangerous days there would appear to be little need for the Forest Patrol Service. It is thought, however, that permission will be given, but only when the two airmen's places have been filled. Capt. Maxwell is the Director of the Ontario Government Air Service, and Captain Tully is the Chief Pilot of the Northern Ontario Government Fire Patrol.

Now Windsor-Windsor

In addition to the projected London (Canada)-London (England) flight, a proposal is on foot for a Windsor (Ont.)-Windsor (England) attempt, C. A. Schiller being the suggested pilot.

Australia and Air Defence

AUSTRALIA is giving considerable and reasonable care to its air defence. All these recent long-distance flights must inevitably awaken certain thoughts in the minds of those with imagination and foresight, for safety in distance is rapidly depreciating now with every successful long-distance flight. In the future there can be no immunity from air attack for any country in the world. If Australia's present plans are realised it will have the most efficient air defence in the Empire outside England. Thirty aeroplanes embodying four types suitable for coastal work will be purchased if the proposals now under consideration materialise.

Batavia-Amsterdam Flight Concluded

THE return flight of Mr. Van Lear Black from Batavia to Amsterdam in the Fokker "Jupiter" monoplane was completed on July 23. This American newspaper proprietor has been the first to make a passenger flight between Holland and the Dutch East Indies. He had two pilots, Geysendorff and Scholte, and the whole tour has taken five weeks. A huge crowd welcomed him on his arrival at Amsterdam in the afternoon. The Dutch Ministers of War and Public Works, the Burgomaster of Amsterdam, and Mr. Tobin, the American Minister, were there, whilst the Queen of Holland appointed Mr. Van Lear Black and his companions Knights of the Order of Orange Nassau. At a banquet the next day they were further complimented. Sir Sefton Brancker was present, and Prince Henry of the Netherlands sent a telegram of congratulation. Mr. Van Black flew to Croydon on July 25.

London-Marseilles-Monaco Service

THE French Air Union have just opened an extension to the London-Marseilles air service to Monaco for Monte Carlo as a preliminary to a regular service. This extension will be operated on the following dates—July 30, August 2, 12, 20, 27, and September 3. The times of the service are—Depart Haymarket, 8 a.m.; Croydon, 9 a.m., and arrive at Monaco, 7.45 p.m. Depart Monaco, 7.30 a.m.; arrive Croydon, 6 p.m.; Haymarket, 7 p.m.

German Duration Record Fails

THE German pilot, Herr Loose, attempted a record duration flight on July 22, flying a Junkers monoplane fitted with a 310 h.p. Junkers engine. He started from Dessau before 5 a.m., but was forced to land near Leipzig at midnight on Friday, slightly damaging his machine, although it is expected that another attempt will be made this week. He had been in the air for 20 hrs., flying backwards and forwards between Dessau and Leipzig, and the consequent failure, due to a defective petrol pipe, was keenly felt in Germany—anxious to create a new record for duration.

World's Balloon Altitude Record

THE balloon record made by Captain H. C. Gray, of the U.S. Air Corps (reported in *FLIGHT* for May 12), has now been officially confirmed by the U.S. Bureau of Standards, which returns the height attained as 42,470 ft. The beaten balloon record was 25,433 ft. On this lonely ascent eight miles above the earth Capt. Gray took wireless with him to beguile away his loneliness, and he heard broadcast music when six miles above Scott Field. Beyond this the music gradually died away. His balloon hovered stationary at 41,000 ft., and seemed to have found its limit, but the

aeronaut helped its progress by attaching some of his gear to a small parachute and throwing it overboard. This gave his balloon another 1,000 ft., but at this altitude gravity defied it and drove it down so rapidly that Capt. Gray threw overboard everything he could spare, but without avail. The downward speed increased so much that he was eventually compelled to forsake the craft at 8,000 ft. and come down in his parachute.

An American Altitude Flight

ANOTHER American attempt on an altitude record is that of Lieut. C. C. Champion, U.S.N., who had an exciting experience on July 25 over Bolling Field, Washington. In a land machine he believed he had reached 48,000 ft., and began to descend, but when at 36,000 ft., several of the nine cylinders of the Wright "Simoon" engine fitted in his Wright "Apache" machine blew out, the cylinder heads and piston rods tearing holes through the wings. His oxygen apparatus was damaged by a flying piece, and in his long glide to earth he had to fight various outbreaks of fire and was blinded by the frost on his goggles. Apparently the barographs show a preliminary reading of 39,000 ft. Mr. Champion holds the record for altitude in seaplanes, and this was his second attempt in two days to make a record in land machines.

Costes' Atlantic Attempt

THE purpose for which Captain Costes will use his Breguet 19A2 biplane, the tests of which he has now completed, is still doubtful. The machine is an army one, and the pilot therefore acts under orders from the French Government. Apparently the French Minister of Commerce, M. Bokanowski, is not favourably inclined to the use of a land machine for long sea flights like the Atlantic flight, which is, provisionally, the intention of Captain Costes. He contemplates the Paris-New York crossing via the Azores, a distance of 3,600 miles. The petrol capacity of the machine is said to make possible a 4,500 mile flight.

The First Official Atlantic Air Mail

THE first letter to be sent by an official air mail across the Atlantic has been received by the Lord Mayor of London. This is a message from the Mayor of New York, which was carried by Commander Byrd on his recent Atlantic flight.

Training for Fog Flying

AN interesting method of training pilots of the Royal Dutch Air Lines for fog and night flying is employed by K.L.M. An aeroplane of the type usually employed on the Air Lines operated by the firm, which has dual control so that either of its two pilots can fly it, is altered so that one pilot has no visibility at all outside of his cockpit, whilst the vision of the other pilot remains normal. The pilot who can see nothing but his instrument board, takes charge of the machine in the air, and, under the orders of the other pilot, performs a series of manoeuvres and flies the machine for a considerable period on his instruments only. In this way, all the K.L.M. pilots are familiarised with flying under conditions of darkness and fog.

Aerial Survey of Australian Air Routes

GROUP-CAPTAIN R. WILLIAMS, Chief of the Australian Air Staff, flying a D.H. 50 biplane, and accompanied by Sqdn.-Ldr. Hepburn and Flt.-Lt. Murphy, each flying D.H.9's, and four mechanics, left Melbourne for Adelaide on an aerial survey to establish air routes and aerodromes throughout Australia. This work will take the party several months to complete.

Schoolboys' Trips in Bombers

AT the invitation of the R.A.F. Depot at Worthy Down, Hants, the boys of Clayesmore School, Winchester, visited the aerodrome one day last week, and fifty of the boys were taken up for flights in night bombers. Needless to say, they thoroughly enjoyed the experience.

Col. Minchin's Atlantic Flight

COL. F. MINCHIN and F/O. Leslie Hamilton flew, in the latter's Vicker's "Viking" amphibian, to Baldonnell Aerodrome, Dublin, on July 26, en route for Clifden, with the object of selecting a suitable starting place for the Atlantic flight to be attempted during August.

The James Dole Hawaii Contest

THREE pilots have entered for the flight from America to Hawaii for a prize of £7,000 offered by Mr. James Dole. They are Maj. Livingston Irving, Mr. Art Goebel, and Mr. F. A. Giles. The latter will fly a Hess "Bluebird" biplane.

THE ROYAL AIR FORCE

London Gazette, July 19, 1927.

General Duties Branch

Flying Officer F. Woolley, D.F.C., is granted a permanent commn. in this rank (July 1). The following are granted short service commissions as Pilot Officers on probation, with effect from, and with seny. of July 1:—C. P. Barker, A. S. Barry, E. S. Bateman, M. G. Bircham, R. W. P. Collings, T. J. Davidson, D. Dickson, H. W. Duffey, F. J. Dunne, M. V. Dyas, F. G. Ferrier, D. G. P. Fitzpatrick, N. H. Fresson, M. G. R. Harris, T. L. Harrison, A. T. C. Hazledine, A. D. Jones, M. R. Kelly, P. B. Manning, L. W. W. Modley, H. A. U. Monro, W. R. Monro Higgs, A. L. T. Naish, B. D. Nicholas, L. S. Rollings, A. M. Stevens, J. W. Stevens, D. I. Stewart, R. W. A. Stroud, W. P. J. Thomson, N. E. Whalley.

The following Pilot Officers are promoted to rank of Flying Officer:—J. E. Bolt (April 12), R. H. Winn (May 28), H. D. Spreckley (June 16).

Flight-Lieut. G. H. Reid, D.F.C., is placed on retired list in that rank on account of ill-health, and is granted the honorary rank of Squadron-Leader (June 21); Squadron-Leader T. F. Hazell, D.S.O., M.C., D.F.C., is placed on retired list at his own request (July 20).

The following Flying Officers are transferred to the Reserve:—Class A:—A. A. B. Chipper (July 20). Class C:—M. C. Dudding (July 15); E. H. Allott (July 18).

Pilot Officer C. F. Ashton resigns his short service commn. (July 20). Flying Officer W. W. Bradford relinquishes his short service commn. on account of ill-health and is permitted to retain his rank (June 28) (substituted for Gazette July 5).

Stores Branch

Flight-Lieut. D. Barron is placed on retired list on account of ill-health (July 21); Flying Officer H. A. Lotherington is transferred to Reserve, Class B (July 19).

Accountant Branch

The following Flying Officers are granted permanent commns. (July 20):—H. E. Cardwell, A.F.C.; J. M. Hopkins.

Medical Branch

Temp. Lieut. H. J. Eagleson (General List, Army, Dental Surgeon) is granted a temp. commn. as a Flying Officer on attachment to R.A.F. (July 13). He will continue to receive emoluments from Army sources; Squad-Leader J. R. Crollius, M.B., is placed on retired list at his own request (July 15).

Reserve of Air Force Officers

General Duties Branch

The following are granted commissions in Class A.A. as Pilot Officers on probation:—P. G. Thomson (July 1); N. N. Birks (July 4). A. B. Mitchell is granted a commn. in Special Reserve as a Pilot Officer on probation (July 1); Flying Officer K. W. Brewster, M.C., is transferred from Class C to Class A (May 9) (Gazette, Nov. 23, 1926, concerning this officer, is cancelled).

The following are transferred from Class A to Class C:—Flight-Lieut. C. F. Briggs (July 14); Flight-Lieut. R. A. Vosper (July 14); Flying Officer G. F. Mackay (July 14); Flying Officer H. B. Williams (July 19). The following Flying Officers relinquish their commns. on completion of service:—A. Duguid, A.F.C. (June 24); C. G. Ferrell (July 19); G. N. Wilton (July 24).

The commns. of the following Pilot Officers on probation are terminated on cessation of duty:—E. N. Parker (June 17); D. R. Fremantle (June 28).

Auxiliary Air Force

General Duties Branch

The following to be Pilot Officers:—No. 602 City of Glasgow (Bombing) Squadron.—Douglas Douglas-Hamilton, Marquess of Douglas and Clydesdale (July 4).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Commodore.—C. R. Samson, C.M.G., D.S.O., A.F.C., to R.A.F. Depot, Uxbridge, 19.6.27.

Wing Commanders.—E. W. Norton, D.S.C., to No. 7 Sqdn., Worthy Down, pending taking over command, 28.7.27. D. Harries, A.F.C., to No. 1 School of Tech. Training (Apprentices), Halton, to Command No. 2, Apprentices Wing, 1.8.27.

Squadron Leader J. Noakes, A.F.C., M.M., to No. 22 Sqdn., Martlesham Heath, instead of to Central Flying School, Wittering, as previously notified, 15.7.27.

Flight Lieutenants: N. H. Jenkins, O.B.E., D.F.C., D.S.M., to No. 22 Sqdn., Martlesham Heath, 10.7.27. R. R. Greenlaw, M.B.E., to Home Communication Flight, Northolt, 13.7.27. E. F. Haylock, to No. 1 Flying Training School, Netheravon, 13.7.27. J. Marsden, to No. 2 Flying Training School, Digby, 13.7.27. H. V. Rowley, to R.A.F. Cadet College, Cranwell, 18.7.27. F. Carpenter, to Air Ministry, 22.7.27. G. W. Birkenshaw, to R.A.F. Cadet College, Cranwell, 18.7.27.

Flying Officers: R. A. B. Stone, to Home Aircraft Depot, Henlow, 10.6.27. W. C. Venmore, to R.A.F. Depot, Uxbridge, 24.5.27. C. H. W. Bolddero, to No. 605 Sqdn., Castle Bromwich, 3.8.27. J. S. Phillips, G. S. White, H. N. Davies, and L. S. Birt, to No. 2 Flying Training School, Digby, 13.7.27.

Accountant Officers, Royal Air Force

The Air Ministry announces that an examination will be held in the latter part of September next under the scheme inaugurated in 1924 for the entry into the Accountant Branch of the Royal Air Force of qualified and experienced civil accountants. About 10 vacancies are likely to be available. The age limits are 22 to 26, extensible to 30 for certain candidates having previous service in the Forces.

The competition will be held in London by the Civil Service Commissioners and will include: (1) an examination in book-keeping and accountancy (excluding partnership and executorship accounts), the standard being that of the final examinations of the Institute of Chartered Accountants and the Society of Incorporated Accountants and Auditors; (2) an examination in English and general knowledge (essay, précis and questions to test knowledge of matters of general interest); and (3) an interview before a selection board at which stress will be laid on accounting experience and special weight given to the experience provided by articulated service.

Improvements have recently been made in the conditions of service of Accountant Officers. Higher retiring ages have been fixed so that a longer career is offered and the pay of the more senior officers has been increased. Emoluments consist on the one hand of pay and on the other of accommodation, fuel, light, rations and personal attendance provided in kind. When the latter are not available cash allowances are granted in lieu. The total of the pay and cash allowances of accountant officers range at present rates from about £400 a year for an officer on first entry to £1,140 a year for a married officer in the highest rank.

The Accountant Branch provides a permanent career. It is not of course, possible to pledge the future but so far as present foresight can show, the Branch will expand in the future and will be subject to no sudden changes affecting adversely the fortunes of its officers. The Air Force is at present a growing service and the duties thrown on the Accountant Branch are such as will, so far as can be foreseen, always be required.

Officers enter the Branch with the rank of Pilot Officer and on probation. After twelve months' satisfactory service they are confirmed in their commission and promoted to Flying Officer. Thereafter promotion is by selection. The next ranks are Flight Lieutenant and Squadron Leader, and it is contemplated that officers who give satisfactory service should be promoted at least up to the latter rank, while a reasonable proportion would be able to expect promotion to the higher rank of Wing Commander and some to the rank of Group Captain. It must be understood that promotion depends on requirements and requirements on future circumstances, but the policy of the Air Ministry is directed to ensuring to Accountant Officers a career not inferior to that indicated above. The length of the career provided depends on the rank attained. The compulsory retiring ages are for Squadron Leaders 53, for Wing Commanders 57 and for Group Captains 61; any officers not attaining the rank of Squadron Leader would be retired at the age of 50.

Application should be made to the Secretary, Air Ministry (S.7), Kingsway, London, W.C.2, for the regulations and for application forms. Completed application forms should reach the Air Ministry by August 15 next, or at latest August 31.

Stores Branch

Squadron Leader A. J. M. Ross, M.B.E., to Air Ministry, 18.7.27.

Medical Branch

Flying Officer B. L. Edwards, to Station H.Q., Hinaidi, 11.6.27.

Flying Officers (Dental): H. I. Clapperton, to Schl. of Tech. Training (Men), Manston, 14.7.27. P. M. Margand, to Electrical and Wireless Schl., Flowerdown, 14.7.27.

NAVAL APPOINTMENTS.

The following appointments were made at the Admiralty on July 13:—

Commnd. Ship.—J. E. Warne, lent to R.A.F. Home Aircraft Depot, Henlow, for course in aircraft repair work (August 22).

Wt. Ship.—W. H. Rendell, S. L. T. Trenwith, F. W. Newbery, S. H. Croucher, and M. J. Hawkins, lent to R.A.F. Home Depot, Henlow, for course in aircraft repair work, August 22.

Commissions for Flying Duties in Royal Air Force

The Air Ministry announces:—Appointments will shortly be made to fill a limited number of vacancies as short-service officers in the R.A.F. for flying duties. These commissions are tenable for five years on the active list and four in the reserve. Candidates must be between the ages of 18 and 25, well educated and of good eyesight and physique. Those accepted after interview at the Air Ministry by a selection board and by a medical board enter as Pilot Officers on probation and receive pay commencing at about £274 a year and free quarters, fuel, light, rations, and part use of servant, or, where these are not available, cash allowances in lieu amounting at present rates to about £141 a year. On transfer to the reserve, when they have completed their five years, they receive a gratuity of £375.

A strictly limited number of short-service officers are, however, retained in the service. A competitive examination is held annually, and is open to officers who are recommended and satisfy certain conditions as to age and service. Those successful at this examination are trained in aeronautical engineering or other specialist subject with a view to being granted permanent commissions.

Application for forms and regulations should be made to the Secretary Air Ministry, Kingsway, London, W.C.2.

Vacancies for R.A.F. Apprentice Clerks

The Air Ministry announces:—Sixty vacancies exist in the Royal Air Force for well-educated boys, between the ages of 15½ and 17, to enter as apprentice clerks. Approximately 40 of the posts will be filled by means of an open competition which will be held by the Civil Service Commissioners in October at various centres and the remaining 20 by direct entry of boys who have obtained an approved school certificate. Successful candidates will be required to complete a period of 12 years' Regular Air Force service after reaching the age of 18, in addition to the training period. At the age of 30 they may return to civil life or may be permitted to re-engage to complete time for pension.

Detailed information regarding the apprentice clerk scheme can be obtained from the Royal Air Force, Gwydyr House, Whitehall, London, S.W.1. Boys entered under this scheme undergo a two years' course of training in clerical duties, typewriting, shorthand, book-keeping and practical office routine, during which time their general education is continued under a staff of graduate teachers. The apprentice clerks are paid 7s. per week for the first and 10s. 6d. per week afterwards until they have both attained the age of 18, and have been posted for duty, after passing their final examination. The subsequent commencing rates of pay, varying from 21s. to 31s. 6d. per week, depend upon the degree of success achieved at this examination. In addition, they receive free board and lodging.

An opportunity will be given to apprentice clerks to volunteer for training as airman pilots. Selection to the number of about 60 annually is made from volunteers of all trades. A few airman pilots are periodically selected for commissioned rank.

AIR DEFENCE MANŒUVRES

(Concluded from page 527)

this raid. A flight of No. 207 B. Squadron also met with disaster. It came in from Rye, but No. 56 F. Squadron caught it near Sevenoaks, and the Siskins shot two of the three D.H.9A's all to pieces. But a little later a second flight from No. 207 got home in a quite successful raid on the much-suffering Kidbrooke. This flight came in from Herne Bay. I could not learn in time for publication the result of two other raids, one by No. 39 B. Squadron from Harwich, and one by No. 12 B. Squadron from Newhaven. No. 39, when I last heard of it, was pursuing a see-saw course to dodge the clouds, and at one time was forced down to 2,000 ft.

The forecast for tonight's weather is gloomy. Despite an improvement at sunset, it is expected to be worse than last night. If so, this will be a great pity, as a big testing of the system of using special constables to observe and report was to have been made. The men have been trained for three years by General Ashmore and the Chief Constables, and are reported to be very keen. There are at present 99 posts in Suffolk, Essex, Kent, Sussex, Surrey, and Hampshire, and the system is to be greatly extended. A fine night during actual manœuvres would naturally whet the enthusiasm of the specials.

IN PARLIAMENT

Civil Aviation

COMMANDER BELLAIRS, on July 16, asked the Prime Minister, in view of the fact that British civil aviation is falling behind some other countries, whether he will consider setting up an independent public inquiry into the whole question of civil aviation and the comparative merits of control by a military department and independent of military control, as in the case of the mercantile marine?

Mr. Baldwin: No, Sir. I do not think any useful purpose would be served by adopting the proposal.

R. A. F. Landing Grounds and Air Ports

COMMANDER BELLAIRS asked what are the comparative figures for the British Empire to the 3,806 air ports or landing stations in the United States of America; and what are the figures for Great Britain?

Capt. Bowyer: The number of landing grounds and air ports in the British Empire is 845, of which 237 are in Great Britain. I should add that information is not available as to the principles on which places are classified in the United States as air ports or landing stations, the latter especially being a very elastic term, and it is, therefore, not possible to say whether the British figures are fairly comparable with the American.

Chief of Air Staff

COMMANDER BELLAIRS asked whether the appointment of the present chief of the Air Staff was made subject to any specified time limit?

Capt. Bowyer: The answer is in the negative.

Flying-Boat "Valkyrie"

COLONEL DAY, on July 20, asked the Secretary of State for Air whether the new aerial battleship *Valkyrie* has successfully completed the Air Ministry tests; to what use in the near future it is intended to put this class of airship or flying boat; and can he give the House full particulars?

Sir S. Hoare: An aircraft of the type referred to has lately completed its tests, and it is intended that it should take part in a cruise of flying boats in the Baltic in the near future. It is a three-engined flying boat and carries a crew of five.

Long-Distance Flight to India

SIR R. THOMAS, on July 21, asked the Secretary of State for Air whether he can state an approximate date in the autumn when it is intended to renew the attempt to make a non-stop flight to India?

Sir Philip Sassoon: A further attempt may be made at any time when my advisers are satisfied with the results of certain tests which have yet to be carried out and when meteorological conditions are favourable. I regret I am unable to give an approximate date.

Missing Aircraft and Search by British Warship

COMMANDER BELLAIRS, on July 22, asked the First Lord of the Admiralty whether he can make a statement as to the extent warships have been moved about apart from their ordinary naval duties in order to render aid or search for aircraft during the present year?

Lieut.-Colonel Headlam: Only one case of a British warship being ordered to search for missing aircraft has been recorded at the Admiralty this year—the case in question being that of the French airman Nungesser.

PERSONALS

To be Married

The marriage between ROBERT H. BURROWS, A.F.C., M.A., son of Mr. Harry Burrows and the late Mrs. Burrows, of Homewood, Stevenage, Herts, and MIRA, daughter of Mr. and Mrs. WALTER B. TURNOCK, of Danygraig, Port Talbot, will take place on August 16 at St. George's, Hanover Square, W. I.

The marriage arranged between Flight-Lieut. T. O. CLOGSTOWN, R.A.F., and Miss KATHARINE LIDDALL will take place on Wednesday, August 24, at 2.30, at St. Saviour's Church, Chelsea.

The marriage of Flying-Officer CAMPBELL MACKENZIE-RICHARDS, younger son of the late Mr. Peter Felix Mackenzie-Richards, M.I.C.E., and Mrs. Mackenzie-Richards, of Hill House, Great Yeldham, Essex, and MIRABEL, only child of Lieut.-Colonel ERNEST CAZENOVE CORBOLD, C.B., and Mrs. Corbold, of West Hill, Aldeburgh, Suffolk, will take place on Wednesday, August 17, at the parish church, Aldeburgh, Suffolk.

The engagement is announced between MAJ. CECIL A. MERCER, late R.A.F., youngest son of the Rev. A. and Mrs. Mercer, of the Vicarage, Muswell Hill, London, and WINIFRED M. SKINNER, eldest daughter of Mr. and Mrs. W. J. A. Skinner, of "Westralia," Chartfield Avenue, Putney.

Married

OLIVER CAMPBELL BRYSON, M.C., D.F.C., A.M., Flight-Lieut. R.A.F., younger and only surviving son of George A. Bryson, Barnet Green, Worcestershire was married, on July 16, at St. George's, Hanover Square, to MILDRED CECILE, younger daughter of Mr. and Mrs. BENJAMIN C. ALLEN, of Chicago, U.S.A.

The marriage of Flight-Lieut. A. C. STEVENS, R.A.F., only son of Mr. and Mrs. C. E. R. Stevens, of Jersey, C.I., with BERYL, youngest daughter of Mr. and Mrs. B. J. GATES, of Wing Park, Wing, Bucks, took place on July 20, at All Saints' Church, Wing, Bucks.

At St. Mary's Church, Westerham, Kent, on July 23, the marriage took place between Flight-Lieut. JOHN WAKELING BAKER, M.C., D.F.C., elder son of the Rev. V. Baker, rector of St. Peter's, Holborn, and Mrs. Baker, and Miss KATHERINE HILARY MARGARET BONHAM-CARTER, only daughter of Lieut.-Col. and Mrs. H. Bonham-Carter, of Westerham.

Deaths

LEONARD WILLIAM HENNEL PHILLIPS, Lieut. R.N. (retired), Flying Officer and Honorary Flight Lieutenant, R.A.F., who died on July 12 as the result of a seaplane accident in Hong-kong Harbour, was the only child of Charles E. and Florence M. Phillips, of St. Keverne, Endsleigh Gardens, Surbiton.

Wing-Commander WILLIAM GEORGE SITWELL, D.S.C., late R.N. and R.A.F., who died on July 21 at R.A.F. Hospital, Halton, aged 37, was the only son of Major Francis H. S. Sitwell, Elmthorpe, Alnwick, and the late Maria Corinna Sitwell.

FLYING OFFICER ARCHIBALD E. P. S. SMITH, of Richmond House, Redditch, died on July 10 in Tidworth Military Hospital, as the result of a motor car accident.

ROYAL AERONAUTICAL SOCIETY

(Official Notice.)

Associate Fellowship Examination.—Provided that a sufficient number of entries is received, the Society's examination for candidates not otherwise qualified for Associate Fellowship will be held during the third week of September. Intending candidates should forward their entry forms as soon as possible, and in any case before the third week of August. Full particulars of the examination can be obtained from the Secretary, Mr. J. Laurence Pritchard.

The Society's Prizes.—The Royal Aeronautical Society offers annually a number of valuable prizes for papers.

The R. 38 Memorial Prize, of twenty-five guineas, is offered annually for the best paper received by the Society on some subject of a technical nature in the Science of Aeronautics, preference being given to papers which relate to airships. Entries must be received by December 31, 1927, and the closing date for papers is March 31, 1928.

The Edward Busk Memorial Prize is offered annually for the best paper received by the Society on some subject of a technical nature in connection with aeroplanes (including seaplanes). Its value is twenty guineas. The closing date for entries is September 30, 1927, and the closing date for the receipt of papers is December 31, 1927.

The Silver Medal of the Society is awarded annually for the best paper published in the *Journal of the Society* in the year under review.—J. Laurence Pritchard, Secretary.

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda: No. 1066 (Ae. 248). Wind Tunnel Experiments on a Symmetrical Aerofoil (Göttingen 429 Section). By C. N. H. Lock, H. C. H. Townend and A. G. Gadd. Price 1s. net. No. 1001 (Ae. 242). The Spinning of Aeroplanes. By S. B. Gates and L. W. Bryant. October, 1926. Price 6s. 6d. net. H.M. Stationery Office, Kingsway, London, W.C.2.

Report on Civil Aviation and Civil Operations by the Royal Canadian Air Force for the Year 1926. Department of National Defence, Ottawa, Canada. Price 20 cents.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

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Published July 28, 1927

- 8,783. S. F. W. KOOLHOVEN. Aircraft intended for military purposes. (273,401.)
17,264. G. W. CALVERT. Helicopters. (273,496.)
17,689. C. MONTERO. Aircraft. (273,503.)
21,339. HANSCHKE (nee SACHS). Flying machines. (273,524.)
26,167. BLACKBURN AEROPLANE AND MOTOR CO., LTD., F. A. BUMPUS and J. D. RENNIE. Flying boats and seaplanes. (273,549.)
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